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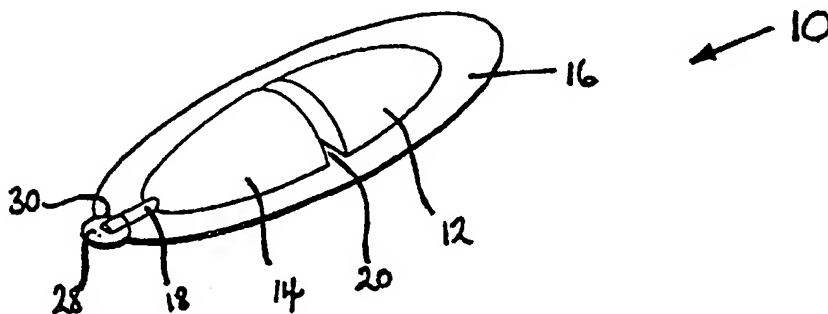
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(54) Title: APPLICATOR



(57) Abstract: An applicator (10; 40; 70; 90; 210; 260) comprises reservoir means (12; 42; 44; 92; 94; 118; 212; 262) for holding a substance to be applied. The applicator further includes delivery means (18; 50; 52; 72; 100; 214) for transferring a desired amount of the substance from the reservoir means to an article. The article may be in the form of strands of hair. Guide means in the form a recess or channel (19; 78; 143; 162; 183; 254) for receiving the article may be provided. The guide means allows the applicator to be guided relatively along the article such that the substance can be applied along the article.

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Applicator

This invention relates to applicators. More particular, but not exclusively the invention relates to applicators for applying a colourant to strands of hair.

There are many substances, such as hair colourant and various adhesives, which are formed by mixing together two different compounds. In many cases, the substance is active for only a short period of time. This requires that the two compounds are stored separately until such time as the substance is required for use, when the two compounds are mixed together to form the substance. The two compounds are generally stored in two separate containers from which they are discharged into a third container for mixing together. This has the disadvantage that an untrained, or careless, user may use the wrong amount of one or each compound. There is also the disadvantage that the mixing process is somewhat messy, and can result in wastage of individual compounds and the mixed substance.

In addition, the mixed substance must then be transferred from the mixing container to the surface to which the substance is to be applied. In many instances a spatula or brush is used to transfer the mixed substance from the mixing container to the surface. This has the disadvantage that some of the substance may drip onto another surface, onto which the substance should not be applied. It can also be difficult to accurately apply the substance to the surface from the spatula or brush.

One example of such a substance is hair colourant which generally comprises chemical dyes and/or bleaches which darken or lighten the colour of the hair, and/or pigments which dramatically alter the hair colour. Hair colourant may result in a permanent, semi-permanent or temporary change to the natural hair colour.

Hair colourant is generally prepared and applied to the hair by a trained hairdresser, particularly when only part of the hair is to be treated. However, in

view of the expense incurred in having a hairdresser apply colourant to the hair, many people choose to apply hair colourant themselves at home. This is a relatively straightforward procedure when all of the hair is to be treated, but it is difficult to apply colourant, in a controlled manner, to only part of the hair at home using existing products.

A second example of such a substance is a two part adhesive, such as that sold under the trade mark Araldite. Once the adhesive has been mixed, the adhesive begins to react with the air and starts to set. This means that there is a fixed time period during which the adhesive is suitable for use. Often too much adhesive is prepared at one time, resulting in wastage of the adhesive because it has begun to set before all the adhesive has been used.

According to the present invention there is provided an applicator comprising reservoir means for holding a substance to be applied and delivery means for transferring a desired amount of the substance from the reservoir means to an article.

The applicator is particularly suitable for applying a substance formed from two different compounds, the compounds being stored separately prior to use and then mixed together to form the said substance. The applicator may be particularly suitable for applying colourant to elongate articles or strands, for example hair. The applicator may alternatively be suitable for applying adhesive to an article.

The applicator may comprise guide means for guiding the applicator and the article such that the applicator is guided relatively along the article. The guide means may comprise a formation for receiving the article to which the substance is to be applied. The formation may define a guide recess or a guide channel for receiving the article. The guide channel or recess may be generally V- or C- shaped in section. The provision of such a formation is suitable where the applicator is used for the application of the substance to elongate articles, particularly colourant to hair. Thus, in this embodiment, strands of hair can be

coloured by arranging the strands in the channel or recess and thereafter transferring the substrate on to the hair. The process of fusing this embodiment allows a length of hair to be coloured by relative movement of the applicator along the length of the hair while the hair is received in the recess or channel and the substance is transferred.

In a first embodiment of the invention, the reservoir means preferably comprises a deformable container and a frame member. The container is preferably formed from a flexible plastics material. The container is desirably sealingly connected to the frame member. The frame member desirably extends at least part-way around the container. The frame member may be formed from an at least partially rigid plastics material such that the frame member is rigid relative to the container.

In an alternative of the first embodiment, the container preferably comprises first and second sub-containers. Each sub-container preferably comprises a bubble formed from a flexible membrane. The bubbles are preferably separated by a breakable seal, most preferably a differential seal, such that when the seal is broken the bubbles come into at least partial communication with one another. Preferably, when the seal is broken the bubbles join together to form the container.

In a further alternative of the first embodiment the bubbles may be respectively provided on first and second mounting members. The mounting members preferably each comprise a sheet of substantially rigid material. Desirably, at least one aperture, and most desirably three apertures, are substantially correspondingly provided in each mounting member. Each bubble preferably includes a mouth across which the respective mounting member is provided, the or each aperture being located within the area of the mouth. A removable lid member is provided across the open side of the or each aperture to prevent leakage of a compound from the respective bubble.

The first and second mounting members are preferably movable between

a first condition in which they are substantially separate from one another and a second condition in which they are secured together to form the frame member. The first and second mounting members are preferably hingedly connected, most preferably by means of a live hinge. In the second condition the or each aperture in the first mounting member is preferably substantially aligned with the corresponding aperture or apertures in the second mounting member, thereby forming one or more connecting conduits between the bubbles.

Desirably, contact adhesive is provided on at least part of one or each mounting member to enable the mounting members to be secured together. The contact adhesive is preferably provided around the or each aperture. The contact adhesive may be provided across substantially the full area of the or each mounting member covered by the respective lid members. The lid members preferably each comprise a strip of material coated, at least on one side, with a substance which permits removal of the lid member from the contact adhesive.

Desirably, at least part of one or each bubble is at least partially transparent so that a compound is at least partially visible therethrough.

A plurality of first and second mounting members, and their associated bubbles and lid members, may be connected together in series. Preferably, a plurality of pairs of hingedly connected first and second mounting members and their associated bubbles and lid members are connected together in series.

In the first embodiment, the delivery means desirably comprises a conduit extending outwardly from within the container, or one or each bubble, through a delivery aperture provided in a wall of the container or bubble. A mounting member may be provided towards one end of the conduit for receipt within the delivery aperture, for thereby attaching the conduit to the container or bubble.

The other end of the conduit may be provided with the guide means which may extend generally outwardly from the said other end.

A closure member is desirably provided over the other end of the conduit. The closure member may comprise a cap of similar section to the conduit for receiving part of the conduit therein. A flange is desirably provided part way along the conduit, the cap extending along the conduit to the flange. The flange preferably extends around substantially the full circumference of the conduit. The cap is preferably provided with an internal thread cooperatively engageable with a corresponding thread provided on the external surface of the conduit.

In an alternative of the first embodiment, the closure member may comprise a section of the conduit at its said other end, the conduit being sealed at the other end and the end section being manually detachable from the rest of the conduit. The end section may be defined by a score line provided around at least part of the circumference of the conduit, the score line aiding detachment of the end section. The score line is preferably shaped such that detachment of the end section forms the guide means.

The conduit may extend outwardly across the frame member, the conduit being connected to the frame member. The frame member may include a manually removable tab section across which the end section of the conduit is provided. The tab section is preferably defined by a score line which is co-linear with the score line on the conduit, such that manual removal of the tab section causes detachment of the end section.

In a further alternative of the first embodiment, the delivery means may comprise a conduit having means for puncturing a wall of the container or bubble provided at one end, so that the one end may be inserted through the wall of the container. The puncturing means desirably comprises a section of the conduit at the one end formed at an acute angle, with respect to the longitudinal direction of the conduit.

A nose member is preferably provided around the other end of the conduit, and may be formed integrally with part of the conduit. The nose member desirably includes guide means, preferably in the form of a guide channel extending generally outwardly from one end, being the said other end of the conduit. The guide channel may be generally V-shaped. The nose member preferably additionally includes a retaining plate extending outwardly from the other end. The one end of the conduit preferably extends over the retaining plate, there being a space between the conduit and the retaining plate. Part of frame member is preferably receivable within the said space.

In a further alternative of the first embodiment, the reservoir means preferably further comprises a vessel having a delivery conduit extending outwardly from one end thereof, through which a first compound may be delivered from the vessel into the deformable container for mixing with a second compound present within the deformable container.

The delivery conduit is desirably of a length such that, when received within the deformable container, the delivery conduit extends at least part way into the deformable container, and most desirably extends to close to the far end of the deformable container.

The delivery conduit is preferably of a sectional size and shape to allow the delivery conduit to be received into the deformable container through the delivery means. The sectional area of the delivery conduit is preferably less than the sectional area of the delivery means such that an air gap exists therebetween when the delivery conduit is received through the delivery means. Stop means may be provided at one or more locations externally of the delivery conduit to restrict the length of the delivery conduit which may enter the deformable container, and to provide an air outlet from the deformable container. Preferably, the stop means comprises at least one and preferably four longitudinally extending flanges or fins circumferentially spaced around the delivery conduit.

The delivery conduit is desirably generally conical or frusto-conical in shape. A closure member may be provided at the free end of the delivery conduit. The closure member preferably comprises a section of the delivery conduit at its free end, the free end of the delivery conduit being sealed and the end section being manually detachable from the rest of the delivery conduit. The end section may be defined by a score line provided around at least part of the circumference of the delivery conduit, the score line aiding detachment of the end section.

The vessel is preferably generally tubular in shape. The vessel is preferably sealed at the other end. The vessel is desirable deformable. The vessel may be formed from a deformable metal, such as aluminium, or may be formed from a deformable plastics material.

The applicator desirably additionally comprises a housing within which the reservoir and the delivery means may be at least partially received. The housing preferably comprises a front section and a back section. The front and back sections are preferably each of similar size and shape. The front and back sections are preferably hingedly connected together, most preferably by means of a live hinge. The front and back sections preferably together define an aperture at one end of the housing. The aperture is desirably of substantially the same sectional area and shape as the conduit of the delivery means.

In an alternative of the first embodiment, the applicator may further comprise a nose section removably attachable to the housing. The front and back sections of the housing desirably together define an external recess at the one end of the housing suitable for closely receiving part of the nose section therein, the recess being of a complimentary shape to the said part of the nose section. The nose section preferably has an aperture provided therethrough for receiving part of the conduit therein. The nose section is desirably removably attachable to the housing by means of an interference or friction fit between the nose section aperture and the said part of the conduit.

The housing or nose section may additionally comprise guide means provided generally externally to the aperture. The guide means preferably comprises a guide channel defined by guide walls extending generally outwardly from the housing or nose section, away from the aperture. The guide channel is desirably generally V-shaped in section. The guide means may alternatively or additionally comprise a tongue member extending generally outwardly from the aperture, the substance being delivered onto the tongue before being delivered to the surface. The guide means are desirably formed integrally with the nose section, or with one or each section of the housing.

Desirably, locking means are provided on the housing for locking the front section and back sections together. The locking means preferably comprises a female lock part provided on one of the front and back sections and a cooperative male lock part correspondingly provided on the other of the front and back sections. The male lock part may comprise a tab member extending generally outwardly from the non hinged side of the front or back section. The female lock part may comprise a recess, provided in the non hinged side of the front or back section, suitable for receiving part of the tab member. The female lock part may additionally comprise a boss provided on the tab member for reception in a correspondingly located aperture provided in the male lock part.

The front and back sections are preferably of a similar shape to the reservoir. The back section is desirably at least partially concave in shape, to provide a space in-between the front and back sections, when closed, in which the reservoir may be retained. The front section preferably comprises a generally annular channel. The inner edge of the annular channel preferably defines an aperture through which part of the container or one or each bubble may extend, to thereby provide manual access to the container or one or each bubble when the reservoir means is enclosed within the housing.

Retaining means are desirably provided on the inner surface of at least one section of the housing for retaining the reservoir means in position therein.

The retaining means desirably comprises socket means for receiving a part of the flange therein. Preferably, socket means are correspondingly provided on each section of the housing. The retaining means may alternatively or additionally comprise a pin member provided on the inner surface of a section of the housing for receipt through a correspondingly located aperture within the frame member.

When the reservoir means and the delivery means are generally located within the housing, the conduit preferably extends to the inner surface of the housing around the aperture, and most preferably sealingly abuts the inner surface of the housing around the aperture.

In an alternative to the first embodiment, the conduit may be of a length such that it extends beyond the housing.

The applicator may additionally comprise a comb member extending generally outwardly from the housing, most preferably from the end of the housing opposite the said one end. The comb member is preferably curved in shape. The comb member may be formed integrally with one or each of the front and back sections of the housing.

The comb member may alternatively be removably attachable to the housing, and may additionally be pivotably attachable to the housing. The comb member is preferably reversibly attachable to the housing, so that the comb member may be arranged such that the curve of the comb is directed in one sense or in the opposite sense. The comb member preferably has an aperture provided therethrough at one end for location over a boss member provided on an internal surface of one of the front and back sections of the housing. The boss member may be the pin member of the retaining means.

The front and back sections of the housing desirably together define an aperture at the said opposite end of the housing through which the comb member may extend.

In a second embodiment of the invention, the reservoir means may have an aperture provided therein towards one end thereof. The reservoir means preferably comprises a housing means, in which the aperture is provided, and a container, receivable within the housing means, for holding the substance to be applied.

The housing means preferably comprises a housing section within which the container is receivable, and a nose section, provided towards one end of the housing section, by which the aperture is defined. The container is preferably selectively openable to deliver a desired amount of substance to the aperture, for subsequent transferral to a section of hair. The nose section may advantageously additionally define guide means for guiding movement of the applicator across a section of hair. The guide means are desirably provided generally adjacent the aperture.

The housing means may define a chamber between the aperture and an openable end of the container. The nose section preferably defines the chamber. The housing section and nose section are preferably independent parts of the housing means. The nose section is preferably removably mountable on the housing section, preferably by cooperating formations which are most preferably in the form of a male to female threaded screw attachment means. Preferably, a cylindrical male member, which may have a threaded outer surface, extends generally outwardly from one end of the housing section for engagement with a female recess of a complementary cylindrical shape defined by the nose section. The female recess may be correspondingly threaded to the male member. Alternatively, the male member and the female recess may be attached together by means of an interference or friction fit therebetween.

The nose section preferably comprises two separable parts. The nose parts are preferably shaped such that they together define the chamber and the aperture. The nose parts are preferably substantially identical to one another.

Advantageously, the delivery means comprises a rotatable delivery member which may comprise a delivery wheel. The delivery wheel may comprise a plurality of teeth. The delivery wheel is preferably mounted for rotation within the aperture such that part of the delivery wheel extends from the reservoir means, and most preferably extends from the nose section.

The container is preferably selectively openable to deliver a desired amount of the substance firstly into the chamber. Preferably, the container is openable by means of a valve means provided at the openable end of the container, for selectively delivering substance into the chamber.

The valve means is preferably a non-return valve, and is most preferably a non-return diaphragm valve. The diaphragm valve is preferably provided within a nozzle provided at the openable end of the container. The valve, the nozzle and the container are preferably formed as a single piece of plastics material. The container is preferably of a generally elongate tubular shape, for reception lengthways within the housing. The container is preferably open at its other end. The nozzle preferably extends generally outwardly from the openable end of the container, and may extend generally outwardly at an angle to the longitudinal axis of the container.

The reservoir means preferably comprises two containers as aforesaid, which may be received lengthways and adjacent one another within the housing section. Preferably, the containers are located within the housing section such that the angled nozzles on the containers extend generally towards one another, and towards the longitudinal axis of the housing means, thereby inducing mixing together of substance delivered from each container into the chamber.

The reservoir means preferably further comprises means for urging a desired amount of substance out of the or each container. The said means preferably comprises a plunger means slidably receivable within the or each container through its open end. The plunger means is preferably manually

operable by a user to apply pressure to a substance in a container, to thereby urge the substance towards the nozzled end of the container and thence out of the container through the valve and the nozzle. The or both plunger means are preferably provided within a shroud member, movement of the shroud member causing corresponding movement of the or each plunger means.

The shroud member preferably comprises a casing, having an end wall member and at least one side wall member, which may be of substantially the same sectional shape as the reservoir housing section such that the housing section may be closely received within the shroud member. The or each plunger means preferably extends generally from the base of the shroud member, within the casing. Thus, as a user applies manual pressure externally to the end wall of the shroud member, the housing section is increasingly received within the shroud member, and the or each plunger means is pushed towards the nozzled end of the or each respective container.

Preferably, a separation member is provided within the chamber, to thereby separate the chamber into first and second sub-chambers, which are preferably separated axially from one another. The first sub-chamber is preferably defined by the cylindrical member and extends from the nozzled end of the or each container to the separation member. The separation member is preferably substantially parallel to the nozzled end of the or each container, and the first sub-chamber may be of substantially constant sectional area. The second sub-chamber preferably extends from the separation member to the aperture in the housing. The sectional area of the second sub-chamber preferably decreases in the direction from the separation member to the aperture. The second sub-chamber is preferably generally frusto-conical in shape.

Preferably, at least one nozzle, and most preferably a spaced pair of nozzles, extend generally outwardly from one side of the separation member into the second sub-chamber. The or each nozzle preferably extends generally outwardly from the separation member at an angle. The nozzles in the spaced

pair preferably extend generally toward one another, and towards the toothed delivery wheel. The spaced pair of nozzles are preferably generally orientated at a 90 degree rotation with respect to the location of the nozzles on the containers.

Preferably, a valve is provided within each nozzle. The valve is preferably a non-return diaphragm valve. The separation plate, nozzles and diaphragm valves are preferably formed as a single piece, preferably of a plastics material.

The toothed delivery wheel preferably comprises a substantially spherical wheel. An annular array of teeth is preferably provided substantially wholly around the circumference of the wheel. The wheel preferably includes a pair of axial pins by which the wheel is rotatably mounted within a socket in the nose section. The axial pins are preferably substantially coaxial with the central axis of the disc defined by the annular array of teeth.

The socket for receiving the spherical wheel is preferably defined by the nose section. The socket preferably defines the aperture in the nose section. The interior of the socket is preferably of a complementary shape to part of the spherical wheel, such that the socket closely fits part of the spherical wheel.

The interior of the socket preferably defines a substantially spherical cavity having a first aperture opening to the second sub-chamber and a second aperture opening externally to the housing. The second aperture is preferably generally rectangular in shape. The width of the second aperture is preferably substantially the same as, or slightly greater than, the width of the annular array of teeth.

The guide means are preferably provided externally to the second aperture for guiding a section of hair across the teeth on the delivery wheel. The guide means preferably comprises a guide channel defined by guide walls provided along substantially the full length of each longitudinal side of the

second aperture.

The present invention further provides a kit of parts for assembling into an applicator according to any of paragraphs seven to forty six.

Specific embodiments of the invention will now be described by way of example only, with reference to the accompanying drawings, in which:

Fig. 1 is a diagrammatic view in perspective of an applicator according to a first embodiment of the present invention;

Fig. 2 diagrammatically shows pressure being applied to each of the bubbles of the applicator of Fig. 1, in order to break the differential seal;

Fig. 3 diagrammatically shows removal of the closure member of the applicator of Fig. 1, following the steps shown in Fig. 2;

Fig. 4 diagrammatically shows pressure being applied to the container of the applicator of Fig. 1, following the steps shown in Figs. 2 and 3, in order to deliver substance from within the container, through the conduit;

Fig. 5 is a diagrammatic plan view of the applicator of Fig. 1;

Fig. 6 is a diagrammatic sectional view along the line A-A of Fig. 5;

Fig. 7 is a diagrammatic perspective view of an applicator according to a second embodiment of the present invention;

Fig. 8 is a diagrammatic perspective view of the underside of the applicator of Fig. 7;

Fig. 9 diagrammatically shows the removable lid members being removed from each of the mounting members;

Fig. 10 is a diagrammatic perspective view of the underside of the applicator of Fig. 7 showing the apertures provided in the mounting members and an outline of the adhesive areas;

Fig. 11 diagrammatically shows how the two mounting members are folded together to form a complete applicator;

Fig. 12 is a diagrammatic perspective view of the applicator of Fig. 7 having the two mounting members folded together, and diagrammatically indicates pressure being applied to each sub-container to force the compounds

through the apertures, to thereby mix them together;

Fig. 13 diagrammatically shows removal of the closure member from the applicator of Fig. 12;

Fig. 14 diagrammatically shows the application of manual pressure to the applicator in order to urge the mixed substance out through the conduits;

Fig. 15 is a diagrammatic view in perspective of an applicator according to a third embodiment of the present invention;

Fig. 16 diagrammatically shows pressure being applied to each bubble in order to break the differential seal therebetween, and to mix together the two compounds respectively stored in each bubble;

Fig. 17 diagrammatically shows the conduit and nose member being moved towards the reservoir of the applicator of Fig. 15;

Fig. 18 shows the completed applicator of Fig. 15, and diagrammatically indicates pressure being applied to the container to force the mixed substance out through the conduit;

Fig. 19 is a diagrammatic view in perspective of an applicator according to a fourth embodiment of the present invention;

Fig. 20 diagrammatically shows pressure being applied to the two bubbles of the applicator of Fig. 19, in order to break the differential seal therebetween;

Fig. 21 shows the applicator of Fig. 19 with the cap removed from the conduit;

Fig. 22 is a diagrammatic view in perspective of a housing suitable for use with the applicator of Fig. 19, the housing being in the open condition;

Fig. 23 is a diagrammatic view in perspective of the internal surfaces of the housing of Fig. 22;

Fig. 24 is a diagrammatic plan view of the housing of Fig. 23;

Fig. 25 is a diagrammatic cross-sectional view along the line B-B of Fig. 24;

Fig. 26 is a diagrammatic cross-sectional view along the line C-C of Fig. 24;

Fig. 27 schematically indicates how the housing of Fig. 23 is closed;

Fig. 28 shows the housing of Figs. 22 and 23 in the closed condition;

Fig. 29 shows the applicator of Fig. 21 being put into the housing of Fig. 23;

Fig. 30 shows the applicator of Fig. 21 in position within the housing of Fig. 23;

Fig. 31 schematically indicates how the housing in the arrangement of Fig. 30 is closed over the applicator;

Fig. 32 is a diagrammatic view in perspective of an applicator according to a variation of the fourth embodiment of the present invention in which the container conduit is longer and extends outwardly from the housing;

Fig. 33 is a diagrammatic view in perspective of an alternative housing suitable for use with the applicators of Figs. 19 and 32, the housing having a removable nose section;

Fig. 34 is a diagrammatic perspective view of a further alternative housing having an alternative design of nose section;

Fig. 35 is a diagrammatic view in perspective from one side of the housing of Fig. 34, with the nose section attached;

Fig. 36 is a diagrammatic view in perspective from the other side of the applicator of Fig. 35;

Fig. 37 is a diagrammatic view of part of the housing of Figs. 33 or 34 having an alternative design of nose section;

Fig. 38 is a diagrammatic view in perspective of an alternative housing including a comb member suitable for use with the applicator of Figs. 19 and 32;

Fig. 39 is a diagrammatic view in perspective of the housing of Fig. 38 with the front and back sections of the housing open;

Fig. 40 is a diagrammatic view in perspective of a further alternative housing including a separate comb member suitable for use with the applicator of Figs. 19 and 32;

Fig. 41 is a diagrammatic view in perspective of the housing of Fig. 40 showing an applicator located therein;

Fig. 42 is a diagrammatic view in perspective of an applicator according to a sixth embodiment of the present invention;

Fig. 43 is a diagrammatic plan view of the applicator of Fig. 42;

Fig. 44 is a diagrammatic side view of the applicator of Fig. 43;

Fig. 45 is a diagrammatic view of one end of the applicator of Fig. 42;

Fig. 46 is a diagrammatic exploded view in perspective of the applicator of Fig. 42;

Figure 47 is a diagrammatic sectional view of the applicator of Fig. 44 along line D-D;

Figure 48 is an enlarged diagrammatic view of detail E of Fig. 47;

Figure 49 is a diagrammatic sectional view along line F-F of Fig. 48;

Figure 50 is a diagrammatic view of a deformable container forming part of an applicator according to a fifth embodiment of the present invention;

Figure 51 is a diagrammatic view of a second container having a delivery conduit for use in conjunction with the container of Fig. 50, to together form an applicator according to the fifth embodiment of the present invention; and

Figure 52 is a diagrammatic representation of the container of Fig. 51 with the delivery conduit inserted into the container of Fig. 50.

A first embodiment of the invention, shown in Figs. 1 to 6, provides and applicator 10, for applying a substance to a surface of an article, such as for example colourant to hair or adhesive to a surface. The applicator 10 comprises two bubbles 12,14 provided on a frame member 16. The bubbles 12,14 and the frame member 16 together form a reservoir. The applicator also comprises delivery means, in the form of a conduit 18, for transferring a desired amount the substance contained within the bubbles, 12,14 from the reservoir to a surface (not shown).

The bubbles 12,14 are separated by a breakable seal, in the form of a differential seal 20. The differential seal 20 is broken, as shown in Fig. 2, by the manual application of pressure, indicated by arrows 22,24, to each bubble 12,14 respectively. The application of pressure to the bubbles 12,14 causes the compounds contained in the bubbles to be displaced towards the differential seal 20, thereby applying pressure to the differential seal. When the applied pressure exceeds a pre-determined level, the differential seal 20 is broken. Once the differential seal 20 is broken, the two bubbles 12,14 are joined

together to form a single large container 26, as shown in Fig. 3.

In this example, the bubbles 12,14 are formed from a transparent flexible plastics material. The bubbles 12,14 are therefore easily deformable, as is required in order to break the differential seal 20 and mix the compounds. The bubbles 12,14 and the differential seal 20 are, in this example, formed from a single piece of plastic sheeting. The frame 16 comprises, in this example, a flat sheet of plastic material. The bubbles 12,14 are bonded to the frame 16 to thereby encapsulate the compound held in each bubble.

The frame 16 includes a tab section 28, which is removable from the body of the frame 16. The conduit 18 extends outwardly from the second bubble 14, across the frame 16 and across part of the tab section 28. The tab section 28 is defined by a score line 30, which also extends across the conduit 18. The conduit 18 therefore comprises a first part 18a which is detachable from a second part of the conduit 18b. The first part 18a of the conduit forms a closure member on the second part of the conduit 18b. Removal of the first part 18a of the conduit, by breaking the score line 30, forms a V or C-shaped guide recess 19 at the end of the second part 18b of the conduit. The mixed substance may then be delivered from the container 26, through the conduit 18b, to the article (not shown). When the article is one or more strands of hair, the hair is received in the guide recess 19 to guide movement of the conduit 18 along a desired length of the hair. The guide recess 19 is thus defined by the score line 30.

The applicator 10 is particularly suitable for applying a substance which is formed from two different compounds, which may be of different colours. The compounds are stored separately respectively in each bubble 12,14, as shown in Fig. 1, until a user desires to use the substance. The differential seal 20 between the bubbles 12,14 is then broken by applying pressure, as shown in Fig. 2. The two compounds may then be mixed together to form the substance by manually manipulating the container 26. The compounds can be seen through the bubbles 12, 14. This enables a user to visually determine when the

two compounds are sufficiently well mixed. When the differential seal 20 is broken a space is formed inbetween the two original bubbles 12, 14. This increases the volume of the space in which the compounds are stored, and in which the compounds are subsequently mixed. Once the substance is mixed, the conduit 18 is opened by removal of the tab section 28 from the frame 16, which causes removal of the end section 18a of the conduit. The conduit 18 is thus opened allowing the substance to be delivered from the container 26 by application of pressure to the container 26, as shown in Fig. 4.

Figs. 7 to 14 show an applicator 40 according to a second embodiment of the invention. The same reference numerals are retained for corresponding features. The applicator 40 comprises two substantially transparent bubbles 42,44, provided respectively on mounting members 46,48. The mounting members 56,58 are hingedly inter-connected by way of a live or integral hinge 54. The bubbles 42,44 and the mounting members 46,48 together form a reservoir. The applicator 40 further comprises delivery means in the form of conduits 50,52, which, in combination, are of the same design as the conduit 18 of the first embodiment.

The conduits 50,52 extend generally outwardly from their respective bubbles 42,44. The conduits 50,52 extend across the respective mounting members 46,48 and partway across a tab section 28 of each mounting member 46,48. The tab section 28 is defined by a score line 30, which also extends across each conduit.

The bubbles, 42,44 are sealingly connected, around their mouth 42a,44a, to the respective mounting members 46,48. As shown in Figs. 8 to 10, three apertures 56 are provided in each mounting member 46,48. The apertures 56 are arranged so as to be located within the mouth 42a,44a of each bubble 42,44.

A removable lid 58 is provided on each mounting member 46,48 across the respective apertures 56, as best seen in Figs. 8 and 9. The removable lids 58 prevent leakage of a compound from within each bubble 42,44, when the

applicator 40 is in its first condition, as shown in Figs. 7 to 11.

Contact adhesive 60 is provided on an area of each mounting member 46,48, around the apertures 56. The adhesive 60 is provided to securely attach the mounting members 46,48 to one another when the applicator 40 is in its second condition as shown in Figs. 12 to 14. The applicator 40 is transformed from its first condition to its second condition by folding the first mounting member 46 over into contact with the second mounting member 48, or vice versa, as shown in Fig. 11.

When the mounting members 46,48 are fixed together, they together form a frame 16 around the bubbles 42,44. Because the apertures 56 in each of the mounting members 46,48 are correspondingly located, each opposing pair of apertures 56 together form a connecting conduit between the two bubbles 42,44. The conduits between the bubbles 42,44 allow for mixing of the compounds stored within the bubbles, in order to form the active substance. This is achieved through manual manipulation of the bubbles 42,44, as indicated by the arrows 62 in Fig. 12. The manual application of pressure to the bubbles 42,44 forces the compounds through the conduits between the bubbles, thereby mixing the compounds together and forming the active substance. The mixing of the compounds may be visually monitored through the bubbles 42, 44, allowing the completion of the mixing to be visually determined.

As discussed above in relation to the first embodiment, the conduits 50 are opened by detachment of the tab section 28 from the frame 16, as shown in Fig. 13. This opens both of the conduits 50,52 connected to their respective bubbles 42,44.

In use, the two compounds which together form the substance to be applied are stored separately respectively in the bubbles 42,44, as shown in Fig. 7. When a user desires to activate and use the substance, the lids 58 are manually removed from the mounting members 46,48. Removal of the lids 58 reveals the apertures 56 and the contact adhesive 60, as shown in Figs. 9 and

10. The mounting members 46,48 are then hingedly moved from their first condition shown in Fig. 7, to their second condition shown in Fig. 12, by hingedly bringing the mounting members together, as shown in Fig. 11. The contact adhesive 60 provided on the mounting members 46,48 securely attaches the mounting members together. In the second condition, corresponding pairs of apertures provided in the mounting members 46,48 together form connecting conduits between the two bubbles 42,44.

The two compounds are then mixed together, as shown in Fig. 12, by means of the application of manual pressure to each bubble. This results in mixing of the two compounds, to form the active substance. Once the mixing has been completed, which may be determined visually, the tab section 28 of the frame 16 is removed, to thereby open the conduits 50,52. The application of pressure 64 to one or each bubble 42,44, as shown in Fig. 14, forces the mixed substance out of the bubbles through the respective conduits 50,52.

An applicator 70 according to a third embodiment of the present invention is shown in Figs. 15 to 18. The same reference numerals will be retained for corresponding features. The applicator 70 comprises two bubbles 12,14 provided on a frame 16, which together form a reservoir. The bubbles are separated by a differential seal 20. As described above in connection with the first embodiment, the differential seal 20 is broken by the manual application of pressure, indicated by arrows 22,24. The two bubbles 12,14, once the differential seal 20 has been broken, together forming a single container 26. The two compounds which together form the substance are respectively stored in each bubble 12,14, and are mixed together by means of manual manipulation of the container 26. As above, the mixing of the compounds may be visually monitored through the container 26.

The applicator 70 further comprises delivery means 72, for transferring a desired amount of the substance from the reservoir container 26 to a surface. The delivery means comprises a conduit 74 which is formed at an angle at one end 74a. A nose member 76 is provided at the other end of the conduit 74. One

side of the nose member 76 is formed into a generally V-shaped guide channel 78. The V-shaped guide recess in the form of a guide channel 78 extends generally outwardly from the other end of the conduit 74. A retaining plate 80 extends generally outwardly from the other side of the nose member 76. The retaining plate is provided generally underneath the conduit 74, with a space provided therebetween.

In use, a user manually breaks the differential seal 20 and mixes the compounds together to form the active substance, as previously described. The reservoir and the delivery means 72 are then brought together, as shown in Fig. 17. The angled end 74a of the conduit 74 is used to puncture a wall of the container 26, so that the conduit 74 may be inserted therethrough into the container. The retaining plate 80 is located underneath the frame, part of the frame being received within the space between the conduit 74 and the retaining plate 80. Once the applicator 70 is assembled, a user may apply manual pressure, as indicated by arrow 82, to the container 26 in order to urge the substance out of the container, through the delivery means 72, as shown in Fig. 18.

Figs. 19 to 21 show an applicator 90 according to a fourth embodiment of the present invention. The applicator 90 comprises two bubbles 92,94, around which there is provided a frame 96. The bubbles 92,94 are separated by a differential seal 98. The bubbles 92,94 and the frame 96 together form a reservoir means.

The applicator 90 further comprises delivery means 100. The delivery means 100 extend generally outwardly from one end of one bubble 94. The delivery means 100 comprises a conduit 102 and a mounting member 104 by which the conduit is connected to the one bubble 94 and the frame 96. The mounting member 104 is incorporated into the frame 96.

A cap 106 is provided over the open end of the conduit 102. The cap 106 is removably mountable on the conduit 102, the inner surface of the cap being

provided with an internal thread which is co-operatively engageable with a corresponding thread 108 provided on the conduit 102. A flange 110 is provided around the conduit 102, generally towards the mounting member 104. The length of the cap 106 is such that when in position on the conduit 102 the cap 106 extends up to, and generally abuts, the flange 110.

In this example, the bubbles 92,94 and the frame 96 are moulded as a single piece of substantially transparent plastic material. The bubbles 92,94 are readily deformable. The frame 96 is rigid relative to the bubbles 92,94. An aperture 112 is provided within the frame, towards the opposite end to the delivery means 100.

The differential seal 98 between the two bubbles 92,94 may be broken by the manual application of pressure, indicated by arrows 114,116, on the bubbles 92,94, as shown in Fig. 20. When the differential seal 98 has been broken, the two bubbles 92,94 together form a single container 118, as shown in Fig. 21. Further manual pressure may be applied to the container 118 in order to mix the contents of the two bubbles, now present in the single container 118, together to form the active substance.

In use, each bubble 92,94 contains a different compound which when mixed together form the active substance which is to be applied. When the user wishes to apply the said substance, manual pressure is applied to the two bubbles 92,94, as shown in Fig. 20, in order to rupture the differential seal 98. The two compounds are thus brought together within a single container 118. Further manual manipulation of the container 118 may be carried out in order to mix the two compounds together in order to form the active substance. The mixing of the compounds may be visually monitored through one or both sides of the container 118. Once the substance is sufficiently mixed, the cap 106 may be removed from the conduit 102, allowing delivery of the active substance through the conduit.

An applicator 260 according to a fifth embodiment of the present

invention is shown in Figs. 50 to 52. The applicator 260 is a two-part applicator, comprising a deformable container 262, shown in Fig. 50, and a vessel 264, shown in Fig. 51. The same reference numerals are retained for corresponding features.

The deformable container 262 is substantially the same as the applicator 90 according to the fourth embodiment of the invention, as shown in Fig. 21, with the following modification. In this example, the reservoir means comprises a frame 96 and a single container 266.

The vessel 264 comprises a generally tubular body 268 having a frusto-conical section 270 at one end. The other end 272 of the body 268 is sealed by means of a crimped seal. The body 268 is deformable, and in this example is formed from deformable aluminium, so that the body 268 is generally similar, for example, to a tube for tomato puree or toothpaste.

The vessel 264 also comprises a delivery conduit, in the form of an elongate nozzle 274. The nozzle 274 extends outwardly from the conical end 270 of the vessel 264. The nozzle 274 is of a generally elongate frusto-conical shape, with its diameter decreasing in the direction away from the body 268. The free end 276 of the nozzle 274 is formed into a closure end section, defined by a score line 278. The closure end 276 is manually removable from the rest of the nozzle 274, for example by cutting along the scoreline 278 to thereby open the nozzle 274.

Four longitudinally extending fins 280 are circumferentially spaced, around the nozzle 274 at its end closest to the body 268. The flanges 280 prevent the nozzle 274 from being sealingly inserted into the conduit 102 of the deformable container 262, as described further below.

In use, a first compound, for example a hair dye, is stored within the deformable container 262 and a second compound, for example peroxide or any other suitable activator, is stored within the vessel 264. In this example, the

substance to be applied is a hair colourant, formed by mixing together the hair dye compound and the activator compound. The dye and the activator must be kept separate until they are required to be used because once the activator is mixed with the dye, oxidation occurs to make an active colourant, which if left unused will deteriorate and degrade.

When a user desires to apply the hair colourant, the colourant is mixed as follows. The closure end 276 of the nozzle 274 of the vessel 264 is broken or cut off, to thereby open the nozzle 274. The nozzle 274 is then inserted into the deformable container 266, through the conduit 102, as illustrated in Fig. 52. The flanges 280 on the nozzle 274 restrict the length of the nozzle 274 which can be inserted into the deformable container 266 through the conduit 102. This is necessary in order to ensure that an air flow path is maintained from the interior of the container 266 to the external atmosphere, in order to allow air to be expelled from the container 266 as the activator compound is inserted into the container 266, as described in more detail below.

Once the nozzle 274 is fully inserted into the container 266 the user may then apply manual pressure to the body 268 in order to squeeze the activator compound out of the body 268, and through the nozzle 274 into the deformable container 266. As the activator compound is delivered into the container 266, air within the container 266 is expelled through the conduit 102. In this example, the nozzle 274 extends to close to the far end 282 of the container 266. This is desirable to ensure complete mixing of the dye and activator compounds.

Following delivery of the required amount of activator from the vessel 264 into the deformable container 266, the nozzle 274 is then withdrawn from the container 266 and the conduit 102. The lid 106 is then replaced on the conduit 102 to seal the container 266. The user may then manually manipulate the container 266 in order to cause mixing of the dye and the activator compounds. As discussed above in connection with the fourth embodiment, the container 266 is formed, at least on one side, from transparent plastic

material. This enables the user to visually monitor the mixing of the compounds within the container 266. Once the substance is sufficiently well mixed, the cap 106 may be removed from the conduit 102, allowing delivery of the active substance through the conduit.

Figs. 22 to 32 show a housing 120 within which the reservoir, namely the container 118 and the delivery conduit 102, of the embodiment shown in Fig. 21, and the container 262 and the delivery conduit 102 of the embodiment shown in Fig. 50, may be at least partially received. The housing 120 comprises a front section 122 and a back section 124. The front section 122 is connected to the back section 124 by means of a live or integral hinge 126. Locking means are provided for securing the front portion 122 and the back portion 124 closed, as shown in Fig. 28. The locking means take the form of a recess 128 provided in the front section in which a tab 130, provided on the back section, is engagably receivable. In this example, the locking means further comprises a boss 132 provided on the external face of the recess 128, for engagement in a correspondingly located aperture 134 within the tab 130.

The front section 122 and the back section 124 are, in this example, of the same size and cross-sectional shape. The front section 122 and the back section 124 are also of similar sectional shape to the frame 96 of the Figs. 19 to 21. The front section 122 and the back section 124 are of slightly larger overall shape than the container 118, the frame 96, the conduit 102 and the mounting member 104 in order to provide sufficient space for them to be received within the housing 120.

The back section 124 is concave in shape in order to define sufficient space between the back portion 124 and the front portion 122 in which to receive some of the container 118, the frame 96, the conduit 102 and the mounting member 104. The front section 122 comprises a generally annular channel, the inner edge of which defines an aperture 136 through which part of the container 118 extends when received within the housing 120.

One end of each of the front section 122 and the back section 124 is shaped so that when the front section 122 and the back section 124 are closed together, they together define an aperture 142 through which substance may be delivered from the conduit 102. The aperture 142 is defined within a guide recess or channel 143 in which the desired length of hair can be received and the applicator guided therealong to apply colourant uniformly to the hair.

In this example, retaining means in the form of sockets 138 and a pin 140 are provided on the housing for retaining the container 118 and the conduit 102 in their correct position within the housing 120. The pin 140 is receivable through the aperture 112 provided in the frame 96. The sockets 138 are of a size and shape suitable for receiving part of flange 110 provided around the conduit 102.

In this example, the housing is an injection moulded plastic structure, formed from a plastic material such as polycarbonate, polypropylene or ABS. As will be appreciated, the housing 120 may be of any size and shape suitable to receive a particular reservoir. It will be appreciated that any of the above described applicators may be used in conjunction with a suitably shaped housing.

In use, the applicator 90 of Fig. 21 is positioned in the back section 124 of the housing 120. The pin 140 being located through the aperture 102 provided in the frame 96, and the flange 110 being located within the socket 138 on the back section 124. When the applicator is located within the back section 124 of the housing, the conduit 102 abuts the wall of the back section 124 which. The conduit 102 thus adjoins the aperture 142.

Fig. 32 shows a further embodiment of the invention which is similar to that described in Figs. 19 to 31, with the following modification. The conduit 102 extends out from the housing 120, through the aperture 142 defined by the front section 122 and the back section 124 of the housing 120.

Fig. 33 shows an alternative housing 150, being substantially the same as the housing 120, with the following modifications. The same reference numerals are retained for corresponding features. A detachable nose section 152 is provided at one end of the housing. The front section 154 and the back section 156 of the housing 150 are shaped so as to define a recess 158 within which the nose section 152 is receivable.

The conduit 102 extends out from the housing 150 into the recess 158. The nose section 152 includes an aperture 160 in which the said end of the conduit 102 is receivable. The nose section 152 is removably attachable to the housing 150 by means of an interference or friction fit attachment between the nose section aperture 160 and the said end of the conduit 102. The nose section 152 further includes a guide channel 162 which is generally V-shaped. The aperture 160 is located generally at the apex of the V-shaped guide channel 162. Thus, in use, the article, for example strands of hair can be received in the guide channel 162, 158 to enable the colourant to be applied uniformly along the desired length of the hair via the conduit 102 and the aperture 102.

Figs. 34 to 36 shows a further alternative housing 170 having a detachable nose member 172. The housing 170 is substantially the same as the housing of Fig. 33, with the following modification. The same reference numerals are retained for corresponding features. The nose section 172 includes an aperture 174 in which the end of the conduit 102 is receivable.

A further alternative nose section 180 is shown in Fig. 37, and is suitable for use with the housings of Figs. 33 to 36. The same reference numerals are retained for corresponding features. The nose section 180 includes a tongue 182 onto which a substance is delivered before being applied to a surface. The tongue 182 comprises a generally semi-circular disc. A plurality of teeth 184 are provided on one edge of the tongue 182. Adjacent teeth 184 may define therebetween a guide recess 188 for use in a similar way to the guide recesses and channels described above.

A further alternative housing 190 is shown in Figs. 38 and 39. The housing 190 is substantially the same as the housings of Figs. 22 to 27 and 33 to 36, with the following modifications. The same reference numerals are retained for corresponding features.

A comb member 192 is provided which extends generally outwardly from the other end of the housing 190. In this example, the comb 192 is formed integrally with the back section 156 of the housing. The comb 192 comprises a tapered, substantially planar plate member. The comb 192 is slightly curved in shape. A plurality of teeth 194 are provided along one edge of the comb 192. The comb may be used to disperse the substance once it has been applied to the desired surface. For example, the comb 192 may be used to comb hair colourant through a section of hair, or may be used to spread adhesive once applied to a surface.

A further alternative housing 200 is shown in Figs. 40 and 41. The housing 200 is substantially the same as the housing 190, with the following modifications. The same reference numerals are retained for corresponding features.

In this example, the comb 202 is provided separately to the housing 200. The comb 202 is attachable to the housing 200 by means of an aperture 204 provided at one end of the comb 202. The aperture 204 is locatable over a boss 206 provided on the internal surface of the back section 156 of the housing 200. The boss 206 may be the pin 140 shown in Figs. 23 to 27 and 29 to 32. As shown in Fig. 41, once the comb 202 is attached to the housing 200, an applicator 90, as described in the fourth embodiment of the invention, may be placed within the housing 200. A boss 206 is receivable through an aperture 112 provided in the frame 96 of the applicator 90. The front section 154 of the housing 200 is then closed over onto the back section 156 of the housing. The flange 208 provided on the internal surface of the front section 154 of the housing then comes into contact with the boss 206, thereby preventing removal of the applicator 90 and the comb 202 from the boss 206. The comb 202 may

pivot about the boss 206, allowing a user to move the comb 202 between the in-use condition as shown, and a storage condition (not shown) in which the comb 202 is arranged generally alongside the housing 200.

An applicator 210 according to a sixth embodiment of the invention is shown in Figs. 42 to 49. The applicator 210, in this example, is for applying colourant to hair. The applicator 210 comprises two main parts, namely a reservoir means 212 in which the colourant is stored, and a toothed delivery wheel 214 operable to transfer a desired amount of the colourant onto a section of hair (not shown).

As shown in Figs. 42 to 49, the reservoir comprises, in general terms, a housing member 216, a nose section 218 removably mountable at one end of the housing member 216, and a shroud member 220 slidably mountable over the housing member 216 at its other end.

The structure of the applicator 210 is shown in more detail in Figs. 46 to 49. As can be seen in these figures, a spaced pair of containers 222 are provided within the housing member 216, for holding the colourant to be applied to the hair. Each container 222 has a nozzle 224 provided at one end and is open at the other end. In this example, the containers 222 are mounted in a spaced relationship on a mounting plate 226, but it will be appreciated that the containers 222 may be provided separately.

A non-return diaphragm valve 225 is provided within each nozzle 224, for controlling the flow of colourant out of each container 222. The non-return valves also prevent any air being taken into the container 222 during, or following, the delivery of colourant through each nozzle 224. This helps to prevent degradation, by oxidization, of the hair colourant. The containers 222, nozzles 224, non-return diaphragm valves 225 and the mounting plate are formed as a single piece of plastics material.

The containers 222 are received within the housing member 216 such

that the nozzleed ends of the containers 222 abut the closed end 216a of the housing member 216, each nozzle 224 protruding through an aperture 228 provided within the said closed end 216a. The nozzles 224 extend generally outwardly from the ends of the containers 222, and are angled towards the longitudinal axis X of the applicator 210, and hence towards one another.

The containers 222 may contain the same colourant substance, or may contain two separate substances which together form the colourant, for example hair dye and peroxide, or any other suitable activator. The dye and activator must be kept separate until they are required to be used because once the activator is mixed with the dye oxidation occurs to make an active colourant, but if left unused the colourant will deteriorate and degrade.

The shroud member 220 comprises a casing 221 having an end wall 220a. Two plungers 230 extend from the end wall 220a within the casing. The shroud member 220 is of substantially the same sectional shape and sectional area as the housing member 216, to enable the housing member 216 to be closely received within the shroud member 220. The open end of the shroud member 220b is locatable over the open end 216b of the housing member 216, and the plungers 230 received within the respective container 222.

A short cylindrical member 232 extends from the closed end 216a of the housing member 216. The outer surface of the cylindrical member 232 is provided with a screw thread for engagement with a corresponding thread provided on the inner surface of a recess 234 provided within the nose section 218. The nose section 218 may thereby be screwed onto the housing member 216. A seal 256 is provided between the end 216a of the housing member and the nose section 218.

As is most clearly shown in Figures 47 to 49, a separation plate 238 is provided over the open end of the cylindrical member 232. The cylindrical member 232 and separation plate 238 together define a first sub-chamber 236 into which colourant may be delivered from the containers 222. A spaced pair

of nozzles 240 are provided on one side of the separation plate 238. The nozzles 240 extend outwardly from the separation plate 238 at an angle towards the longitudinal axis X of the applicator 210, and are directed towards one another. A non-return diaphragm valve 225 is provided within each nozzle 240, to control the delivery of colourant from the first sub-chamber 236 into a second sub-chamber 242, to be described in more detail below.

The separation plate 238 is arranged generally parallel to the closed end 216a of the housing member 216, and the nozzle ends of the containers 222. The spaced pair of nozzles 240 on the separation plate 238 are orientated at approximately a 90° rotation from the nozzles 224 on the containers 222. There is thus provided a spaced, crossed arrangement of two pairs of nozzles 224,240.

As a result of the angle of each nozzle 224,240, colourant delivered through one nozzle 224,240 in each pair of nozzles 224,240, into the first sub-chamber 236 and second sub-chamber 242 respectively, is caused to mix with colourant delivered through the other nozzle 224,240 of each pair. The crossed arrangement of the two pairs of nozzles 224,240 provides improved mixing of the colourant as it is passed from the first sub-chamber 236 into the second sub-chamber 242.

As shown in Figure 46, the nose section 218 comprises two identical parts 244, which together define the recess 234 for receiving the cylindrical member 232, by which the nose section 218 may be attached to the housing member 216. The nose section parts 244 additionally define the second chamber 242.

The nose section parts 244 further define a socket 246 for receiving the toothed delivery wheel 214. The toothed delivery wheel 214 is generally spherical in shape, and the socket 246 is of a complementary part-spherical shape. The socket 246 provides a selectively openable aperture between the second sub-chamber 242 and the exterior of the applicator 210.

As is best seen in Figures 46 and 49, an annular array of teeth 248 are provided around the circumference of the wheel 214. The toothed delivery wheel 214 is rotatably mounted within the socket 246 on a pair of pins 250, and may rotate in either direction, as indicated by the arrow Z in Figure 48. The pins 250 are coaxial with the central axis of the disc defined by the array of teeth 248.

The non-toothed parts of the wheel 214 are sealingly seated within the socket 246. The teeth in the array of teeth 248 sealingly engage with the interior surface of the socket 246 during a first part of a rotation of the wheel 214. The teeth in the array 248 pass through the second chamber during a second part of a rotation. The teeth then again seal against the internal face of the socket 246 during a third part of the rotation. During the final part of a rotation of the wheel the teeth in the array 248 are presented externally to the applicator 210, for contact with a section of hair.

The socket 246 has a first opening which opens inwardly into the second sub-chamber 242, and a second opening which opens externally to the applicator 210. The second opening from the socket 246 is of generally rectangular section, and is of substantially the same width as the array of teeth 248. The first opening is of generally elliptical section, its major axis being greater than the width of the array of teeth 248.

The end 218a of the nose section is shaped to include two guide members 252 which together define a guide channel 254 for receiving a section of hair, and guiding the movement of the array of teeth 248 along the section of hair.

The applicator 210 is manually operable by a user as follows. The user holds the applicator 210 in one hand, with the end 220a of the shroud member 220 uppermost and the end of the nose section 218 in contact with, or close to, the hair to be coloured. The user then applies pressure to the end 220a of the shroud member 220, thereby pushing the shroud member 220 over the housing

member 216, and causing the plungers 230 to move towards the nozzled ends of the containers 222. Pressure is thereby applied to the colourant within the containers 222, and the colourant is forced through the non-return diaphragm valves 225 within the nozzles 224 into the first sub-chamber 236.

As the colourant is forced through the nozzles 224 the colourant from the separate containers 222 undergoes a degree of mixing as it enters the first sub-chamber 236. Colourant continues to pass into the first sub-chamber 236 until the first sub-chamber 236 is substantially full. The further delivery of colourant into the first sub-chamber then causes colourant to pass through the nozzles 240 into the second sub-chamber 242. Partially mixed colourant from the first sub-chamber 236 is thereby further mixed on passing into the second sub-chamber 242.

The applicator 210 is positioned over a section of hair to which colourant is to be applied, the section of hair being located within the guide channel 254. Whilst continuing to apply pressure to the end 220a of the shroud member 220, a user may move the applicator along the section of hair, thereby causing rotation of the toothed wheel member 214 within the socket 246. As the wheel member 214 rotates, colourant is collected from the second sub-chamber 242, within the gaps between the teeth in the array 248, and is carried to the open end of the socket 246, where the colourant is deposited onto the section of hair. The user continues to apply pressure to the shroud member 220 whilst moving the applicator 210 along the section of hair to which the colourant is to be applied, until application of the colourant is completed. The user may then repeat the procedure for a further section of hair.

It will be appreciated that the applicator 210 may be provided with the reservoir fully constructed, having containers 222 full of colourant provided therein, for immediate use. Once the applicator has been used, it may then be disposed of. Alternatively, the applicator may be provided with the housing member 216 and nose section 218 constructed and connected together, and the shroud member 220 and containers 222 containing the colourant provided

separately. In this arrangement it is envisaged that the applicator 210 may be re-used by replacing spent containers 222 with new, full containers holding further colourant. The housing member 216, nose section 218 and shroud member 220 may be separated to allow cleaning of them before the new containers 222 are inserted, and the applicator 210 re-used.

Various modifications may be made to the described embodiments without departing from the cope of the present invention. For example, the housing may be used with any of the other applicators described above, although it will be appreciated that the socket and the pin may need to be moved or removed in order to accommodate these applicators. It will also be appreciated that the applicators and their housing may be of a different shape to that shown in the figures, and that the housing does not have to be of the same general shape as the reservoir but merely be able to receive the reservoir and the delivery means therein.

The two bubbles may be of different relative sizes depending at least in part upon the relative quantities of each element required to be mixed together to form a substance. It will also be appreciated that the tab section may be of a different shape to that shown.

Referring in particular to the second embodiment, the live hinge connecting the two mounting members may be replaced by a different form of hinge mechanism, or may be removed entirely so that the two bubbles are initially separate from one another. It will be appreciated that the removable lids provided across the apertures in the mounting members may be of a different size and shape to that shown. In addition, a different number of apertures may be used, and the apertures may be of a different shape. In addition, the contact adhesive may be provided across the full extent of one or each mounting member, or may only be provided around the rim of each aperture.

A plurality of mounting members, and their associated bubbles and lids,

may be connected together in series for convenient storage. In particular, a plurality of hinged pairs of mounting member may be connected together in series.

Referring to the third embodiment, it will be appreciated that the delivery means may be different to that shown, and may simply comprise a conduit. It will also be appreciated that the nose member may be of a different shape to that shown, and that the guide channel may be removed. In addition, the retaining plate may be of a different shape and size to that shown, or may be removed entirely.

Referring to the fourth embodiment of the invention described above, it will again be appreciated that the bubbles may be of a different size and shape to that shown. The mounting member of the delivery means may be of a different size and shape to that shown, in particular, the mounting member does not have to extend across the full width of the frame and/or the sub-container. It will also be appreciated that the cap may be attached to the conduit by an alternative locking arrangement. The conduit and the cap may have a different sectional shape to that shown.

The housing described above may be of a different general shape to that shown. The sockets for receiving respective parts of the flange provided on the conduit may be of a different size and shape, and may be provided at a different location, or may be removed entirely. The pin shown on the back section of the housing may alternatively be located on the front section of the housing, and may be at a different relative position. In addition, more than one pin may be provided for location through a corresponding one of a plurality of holes provided in the frame, or the pin may be removed entirely. A different form of locking means may be used to lock the front and back sections of the housing together in the closed condition. The aperture defined by the front and back sections of the housing may be of a different size and shape to that shown. The guide channel defined by the front and back sections of the housing may also be of a different size and shape to that shown, or may be

removed.

The nose sections of the alternative housing described above may be of a different size and shape to that shown. The guide channel included in the nose member may be a different size and shape to that shown.

The comb provided on the further alternative housing described may be of a different size and shape to that shown, and may have a different number of teeth to that shown. It will be appreciated that the comb may be arranged such that the curve of the comb is directed in either sense. The comb may alternatively be provided on the front section of the housing. It will be appreciated that the separate comb may be arranged to curve in either sense, and is therefore reversible.

Referring to the sixth embodiment of the invention described above, the nose section 218 may be permanently secured onto the housing member 216, or may be detachable from the housing member to enable cleaning of the nose section. In the example described, two containers 222 holding colourant are provided, and are mounted on a mounting plate 226. It will be appreciated that a different number of containers may be used, and that the containers 222 may be separately provided, having no mounting plate 226. A corresponding number of plungers 230 will be provided within the shroud member 220. A different type of valve may be provided within the nozzles 224, 240, and the nozzle, valve and container may be provided as separate parts rather than being formed as a single piece as is described.

It will be appreciated that a different number of mixing chambers may be provided within the nose section. For example, a single mixing chamber may be sufficient where a single substance is contained within the containers 222, whilst it may be preferable to have a greater number of chambers in some instances where a greater degree of mixing of two or more separate substances is required before application to the hair. Where a single chamber is provided, it will be appreciated that there is no need to have the separation plate 238. A

different number of nozzles may be provided within the separation plate.

The toothed delivery wheel may be of a different shape to that described, and may have a different arrangement of teeth provided thereon.

Whilst endeavouring in the foregoing specification to draw attention to those features of the invention believed to be of particular importance it should be understood that the Applicant claims protection in respect of any patentable feature or combination of features hereinbefore referred to and/or shown in the drawings whether or not particular emphasis has been placed thereon.

Claims:-

1. An applicator comprising reservoir means for holding a substance to be applied to an article and delivery means for transferring a desired amount of the substance from the reservoir means to the article.
2. An applicator according to claim 1, wherein the applicator further includes guide means for guiding the applicator and the article relative to each other.
3. An applicator according to claim 2, wherein the guide means comprises a formation to receive a portion of the article, the formation defining a recess or a channel.
4. An applicator according to claim 3, wherein the formation defines a generally V or C-shaped recess or channel.
5. An applicator according to any preceding claim, wherein the reservoir means comprises a deformable container means and a frame member, the container being sealingly connected to the frame member, and the frame member at least partially surrounding the container means.
6. An applicator according to claim 5, wherein the container means comprises first and second sub-containers, each sub-container comprising a bubble formed from a flexible membrane.
7. An applicator according to claim 6, wherein the bubbles are separated by a breakable seal, such that when the seal is broken the bubbles come into at least partial communication with one another.
8. An applicator according to claim 6, wherein the bubbles are respectively provided on first and second mounting members, each mounting member comprising a sheet of substantially rigid material, and at least one aperture is

substantially correspondingly provided in each mounting member, and each bubble includes a mouth across which the respective mounting member is provided, the or each aperture being located within the area of the mouth.

9. An applicator according to claim 8, wherein the first and second mounting members are movable between a first condition in which they are substantially separate from one another and a second condition in which they are secured together to form the frame member.

10. An applicator according to claim 9, wherein the first and second mounting members are hingedly connected, and in the second condition the or each aperture in the first mounting member is substantially aligned with the corresponding aperture or apertures in the second mounting member, thereby forming one or more connecting conduits between the bubbles.

11. An applicator according to claim 9 or 10, wherein adhesive is provided on at least part of one or each mounting member to enable the mounting members to be secured together.

12. An applicator according to claim 11, wherein the adhesive is a contact adhesive provided around the or each aperture.

13. An applicator according to claim 12, wherein a removable lid member is provided across the open side of each aperture to substantially prevent leakage of the substance from the respective bubble, and the contact adhesive is provided across substantially the full area of the or each mounting member covered by the respective lid members.

14. An applicator according to claim 13, wherein each lid member comprises a strip of material coated, at least on one side, with a substance which permits removal of the lid member from the contact adhesive.

15. An applicator according to any preceding claim, in which the delivery

means desirably comprises a conduit having a proximal end closest to the container means, and a distal end through which the substance can be dispensed, the conduit extending through a delivery aperture provided in a wall of the container means.

16. An applicator according to claim 15, wherein the closure member comprises a section of the conduit adjacent said distal end, the conduit being sealed at said distal end and said end section being manually detachable from the rest of the conduit.

17. An applicator according to claim 16, wherein the conduit extends outwardly across the frame member, the conduit being connected to the frame member, the frame member including a manually removable tab section across which the end section of the conduit is provided.

18. An applicator according to any of claims 15 to 17, wherein the delivery means includes a conduit having means for puncturing a wall of the container or bubble provided at said proximal end, so that said proximal end can be inserted through the wall of the container, the puncturing means comprising a section of the conduit at the one end formed at an acute angle, with respect to the longitudinal direction of the conduit.

19. An applicator according to any of claims 15 to 18, wherein a nose member is provided around said distal end of the conduit, the nose member including a retaining plate extending outwardly from said distal end, the proximal end of the conduit extending over the retaining plate, there being a space between the conduit and the retaining plate, such that part of the frame member is receivable within the said space.

20. An applicator according to claim 1 or 2, wherein the reservoir means further comprises a vessel having a delivery conduit extending outwardly from one end thereof, through which a first compound can be delivered from the vessel into the deformable container for mixing with a second compound present within the deformable container.

21. An applicator according to claim 20, wherein the delivery conduit is of a length such that, when received within the deformable container, the delivery conduit extends at least part way into the deformable container.

22. An applicator according to claim 20 or 21, wherein the delivery conduit is of a sectional size and shape to allow the delivery conduit to be received into the deformable container through the delivery means, the sectional area of the delivery conduit being less than the sectional area of the delivery means such that an air gap exists therebetween when the delivery conduit is received through the delivery means, and a stop means is provided at one or more locations externally of the delivery conduit to restrict the length of the delivery conduit which may enter the deformable container, and to provide an air outlet from the deformable container.

23. An applicator according to any preceding claim, further including a housing within which the reservoir and the delivery means are at least partially received, the housing comprising a front section and a back section hingedly connected together, wherein the front and back sections together define an aperture at one end of the housing, the aperture being of substantially the same sectional area and shape as the conduit of the delivery means.

24. An applicator according to any of claims 1, 2, or 20 to 22, wherein the applicator further includes a nose section removably attachable to a housing, the front and back sections of the housing together defining an external recess at the proximal end of the housing suitable for closely receiving part of the nose section therein, the recess being of a complimentary shape to the said part of the nose section.

25. An applicator according to claim 24, wherein the nose section has an aperture provided therethrough for receiving part of the conduit therein, the nose section being removably attachable to the housing by means of an interference or friction fit between the nose section aperture and the said part of the conduit.

26. An applicator according to claim 23, 24 or 25 when dependent or ultimately dependent on claim 2, wherein the guide means includes a guide channel defined by guide walls extending generally outwardly from the housing or nose section, away from the aperture, the guide means including a tongue member extending generally outwardly from the aperture, the substance being delivered onto the tongue before being delivered to the surface.

27. An applicator according to any of claims 23 to 26, wherein locking means are provided on the housing for locking the front section and back sections together, the locking means comprising a female lock part provided on one of the front and back sections and a cooperative male lock part correspondingly provided on the other of the front and back sections.

28. An applicator according to claim 27, wherein the male lock part comprises a tab member extending generally outwardly from the non hinged side of the front or back section, and the female lock part comprises a recess, provided in the non hinged side of the front or back section, suitable for receiving part of the tab member, the female lock part additionally comprising a boss provided on the tab member for reception in a correspondingly located aperture provided in the male lock part.

29. An applicator according to claim 28, wherein the front and back sections are of a similar shape to the reservoir, the back section being at least partially concave in shape, to provide a space between the front and back sections, when closed, in which the reservoir may be retained, and the front section comprising a generally annular channel defining an aperture through which part of the container or one or each bubble extends, to thereby provide manual access to the container or one or each bubble when the reservoir means is enclosed within the housing.

30. An applicator according to claim 29, wherein retaining means are provided on the inner surface of at least one section of the housing for retaining the reservoir means in position therein, the retaining means including

socket means for receiving a part of the flange therein.

31. An applicator according to claim 30, wherein socket means are correspondingly provided on each section of the housing.

32. An applicator according to claim 30 or 31, wherein the retaining means includes a pin member provided on the inner surface of a section of the housing for receipt through a correspondingly located aperture within the frame member.

33. An applicator according to claim 32, wherein when the reservoir means and the delivery means are generally located within the housing, the conduit extends to the inner surface of the housing around the aperture, and sealingly abuts the inner surface of the housing around the aperture.

34. An applicator according to any of claims 23 to 33, wherein a comb member extending generally outwardly from one end of the housing.

35. An applicator according to claim 34, wherein the comb member is formed integrally with one or each of the front and back sections of the housing.

36. An applicator according to claim 34, wherein the comb member is removably attached to the housing, and is pivotably attached to the housing.

37. An applicator according to claim 36, wherein the comb member is curved and is reversibly attached to the housing, so that the comb member is arranged such that the curve of the comb is directed in one sense or in the opposite sense.

38. An applicator according to any of claims 34 to 37, wherein the comb member has an aperture provided therethrough at one end for location over a boss member provided on an internal surface of one of the front and back

sections of the housing.

39. An applicator according to any of claims 1 to 22, wherein the reservoir means has an aperture provided therein towards one end thereof, the reservoir means comprising housing means, in which the aperture is provided, and a container, receivable within the housing means, for holding the substance to be applied.

40. An applicator according to claim 29, wherein the housing means comprises a housing section within which the container is receivable, and a nose section, provided towards one end of the housing section, by which the aperture is defined, the container being selectively openable to deliver a desired amount of substance to the aperture, for subsequent transferral to the article.

41. An applicator according to claim 40, wherein the housing section and nose section are independent parts of the housing means, the nose section defining a chamber between the aperture and an openable end of the container.

42. An applicator according to claim 41, wherein the nose section is removably mountable on the housing section, by cooperating formations which are in the form of a male to female threaded screw attachment means, a cylindrical male member, having a threaded outer surface, extends generally outwardly from one end of the housing section for engagement with a female recess of a complementary cylindrical shape defined by the nose section, the female recess may be correspondingly threaded to the male member.

43. An applicator according to claim 42, wherein the nose section comprises two separable parts, the nose parts being shaped such that they together define the chamber and the aperture.

44. An applicator according to any of claims 40 to 43, wherein the delivery means comprises a rotatable delivery member comprising a delivery wheel, having a plurality of teeth, the delivery wheel being mounted for rotation

within the aperture such that part of the delivery wheel extends from the nose section.

45. An applicator according to any of claims 40 to 44, wherein the container is selectively openable to deliver a desired amount of the substance firstly into the chamber.

46. An applicator according to claim 45, wherein the container includes valve means to effect said selective opening thereof, the valve means being a non-return valve, provided within a nozzle provided at the openable end of the container.

47. An applicator according to any of claims 40 to 46, wherein the container is of a generally elongate tubular shape, for reception lengthways within the housing, the container is open at one end, the nozzle extending generally outwardly from the openable end of the container, at an angle to the longitudinal axis of the container.

48. An applicator according to any of claims 40 to 47, wherein the reservoir means comprises two containers as aforesaid, which are received lengthways and adjacent one another within the housing section, the containers being located within the housing section such that the angled nozzles on the containers extend generally towards one another, and towards the longitudinal axis of the housing means, thereby inducing mixing together of substance delivered from each container into the chamber.

49. An applicator according to any of claims 40 to 48, wherein the reservoir means further comprises means for urging a desired amount of substance out of the or each container, the urging means comprising a plunger means slidably receivable within the or each container through its open end, the plunger means being manually operable by a user to apply pressure to a substance in a container, to thereby urge the substance towards the nozzled end of the container and thence out of the container through the valve and the

nozzle.

50. An applicator according to claim 49, wherein the or each plunger means is provided within a shroud member, movement of the shroud member causing corresponding movement of the or each plunger means.

51. An applicator according to claim 50, wherein the shroud member comprises a casing, having an end wall member and at least one side wall member of substantially the same sectional shape as the reservoir housing section such that the housing section may be closely received within the shroud member, the or each plunger means extends generally from the base of the shroud member, within the casing.

52. An applicator according to any of claims 50 to 51, wherein a separation member is provided within the chamber, to thereby separate the chamber into first and second sub-chambers, the first sub-chamber being defined by the cylindrical member and extends from the nozzled end of the or each container to the separation member, and the second sub-chamber extends from the separation member to the aperture in the housing.

53. An applicator according to claim 52, wherein at least one nozzle extends generally outwardly from one side of the separation member into the second sub-chamber.

54. An applicator according to claim 53, wherein a spaced pair of nozzles are provided, which extend generally toward one another, and towards the toothed delivery wheel, the spaced pair of nozzles being generally orientated at a 90 degree angle with respect to the location of the nozzles on the containers.

55. An applicator according to claim 44, wherein the toothed delivery wheel comprises a substantially spherical wheel, an annular array of teeth is provided substantially wholly around the circumference of the wheel, and the wheel includes a pair of axial pins by which the wheel is rotatably mounted within a

socket in the nose section, the axial pins being substantially coaxial with the central axis of the disc defined by the annular array of teeth.

56. An applicator according to claim 55, wherein the socket for receiving the spherical wheel is defined by the nose section, the socket defining the aperture in the nose section, and the interior of the socket is of a complementary shape to part of the spherical wheel, such that the socket closely fits part of the spherical wheel.

57. An applicator according to claim 56, wherein the interior of the socket defines a substantially spherical cavity having a first aperture opening to the second sub-chamber and a second aperture opening externally to the housing, the second aperture being generally rectangular in shape.

58. An applicator substantially as herein described with reference to the accompanying drawings.

59. Any novel subject matter or combination including novel subject matter disclosed herein, whether or not within the scope of or relating to the same invention as any of the preceding claims.

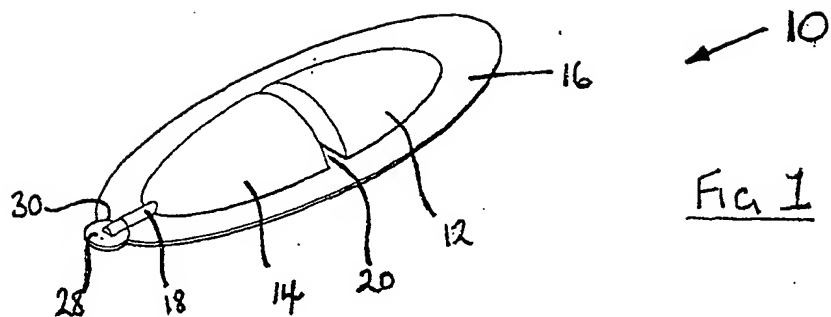


Fig 2

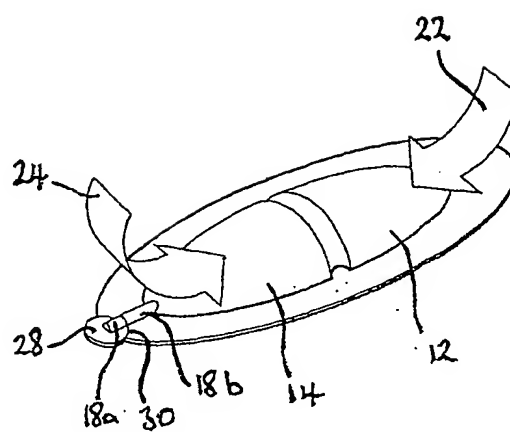


Fig 3

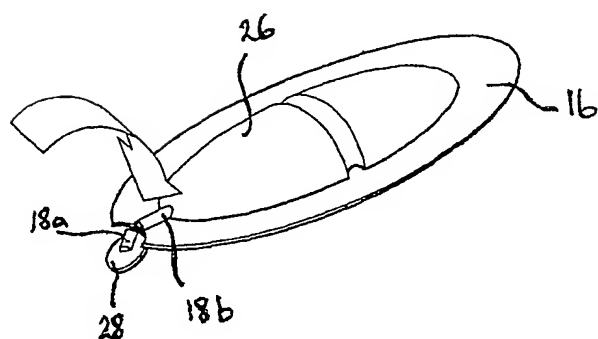
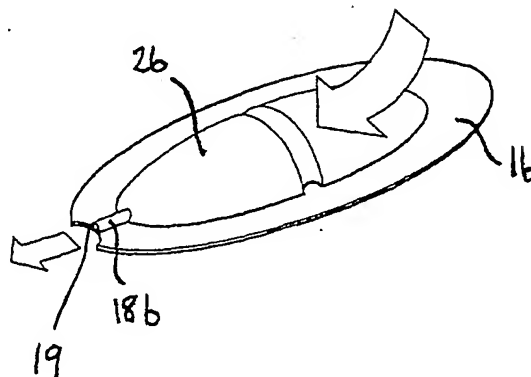


Fig 4



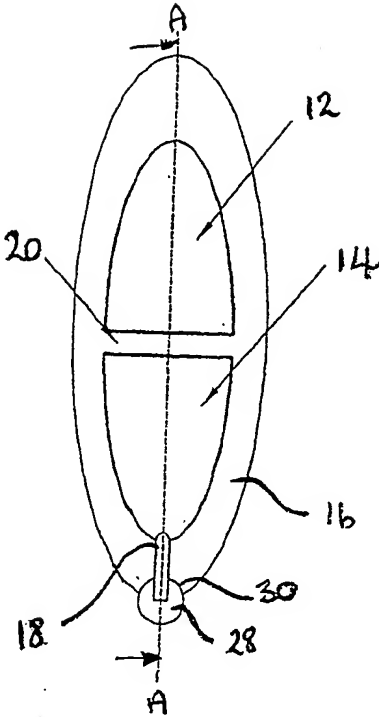


Fig 5

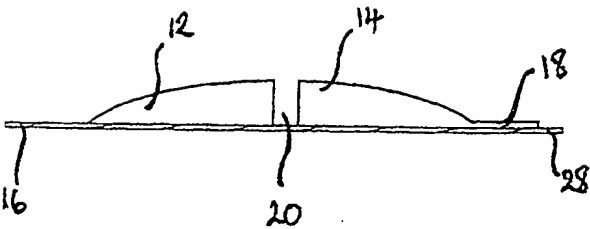
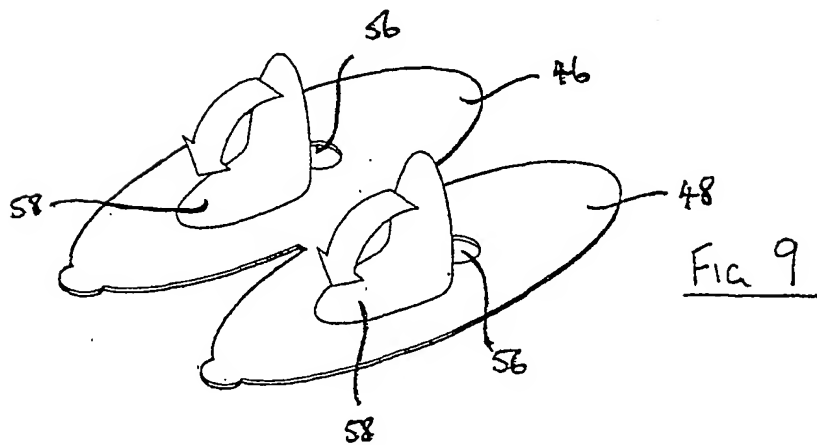
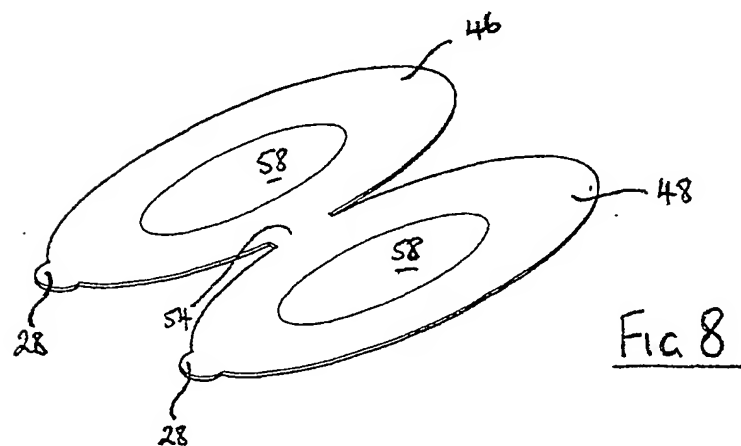
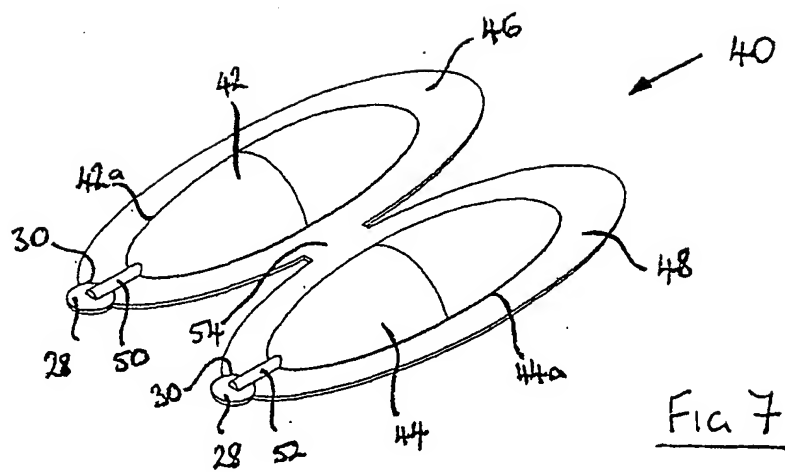
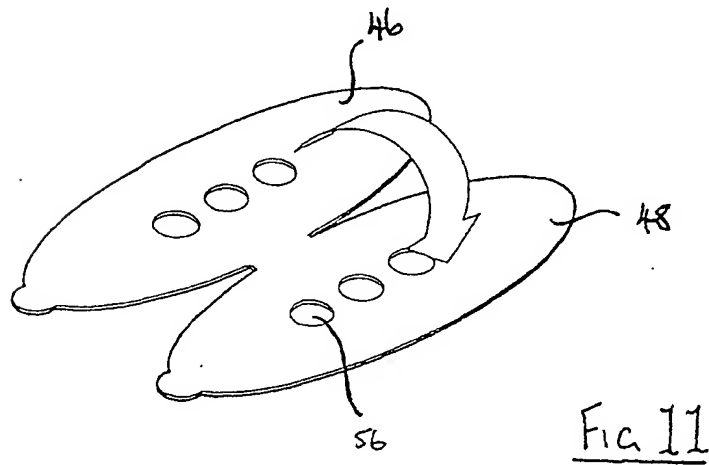
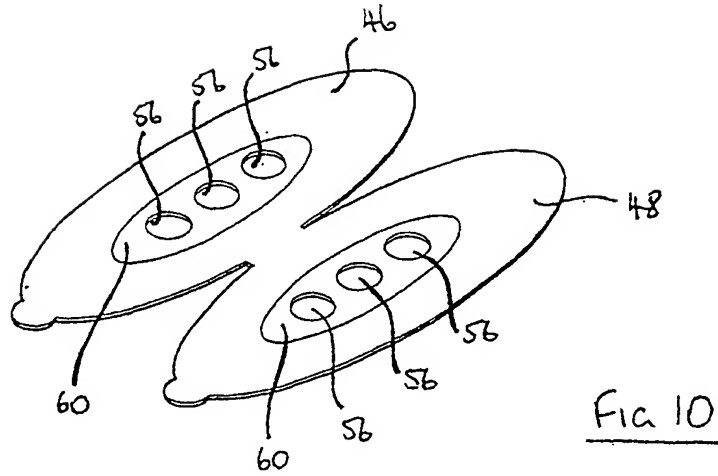
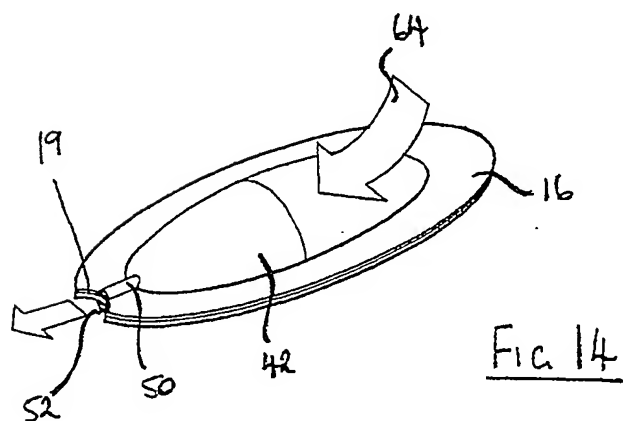
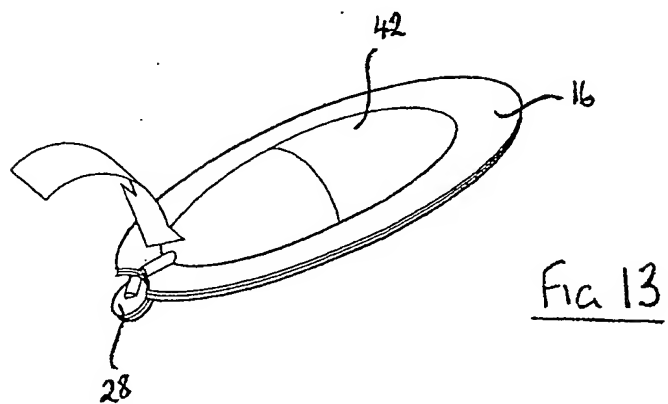
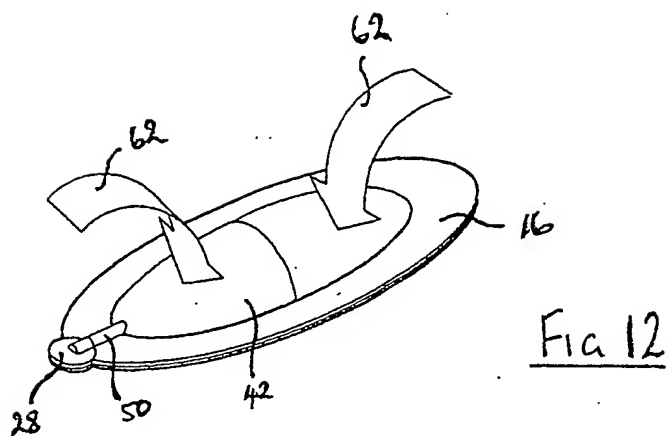
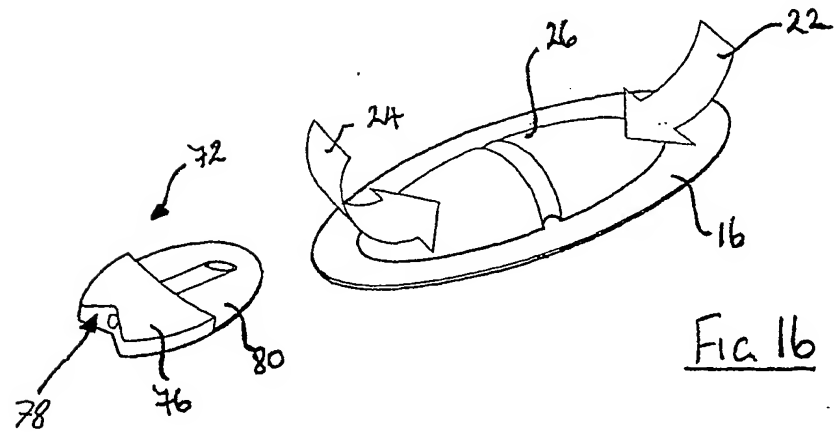
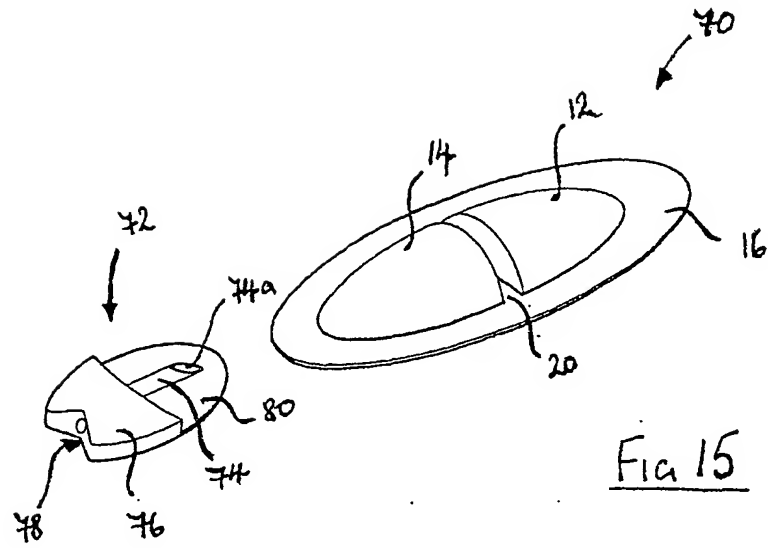


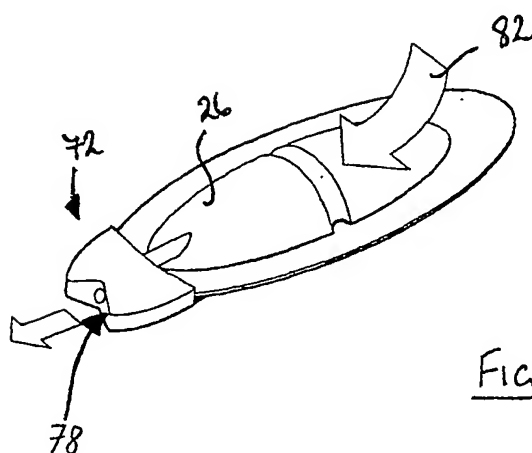
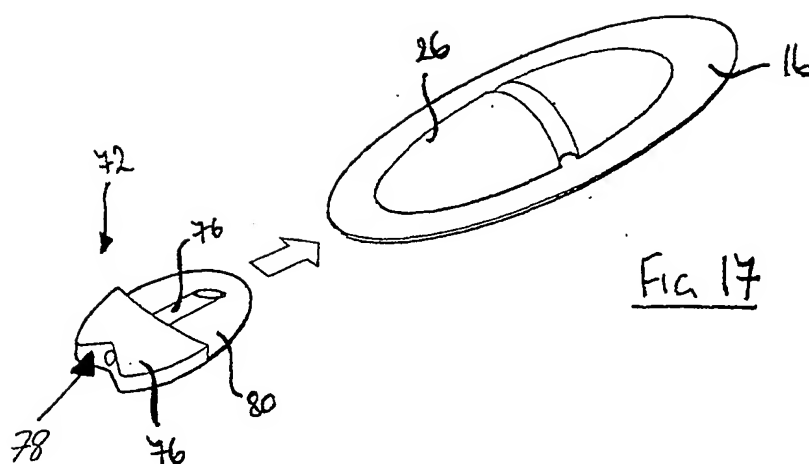
Fig 6

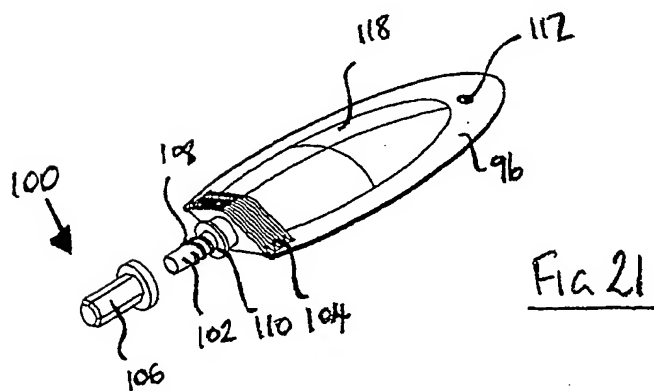
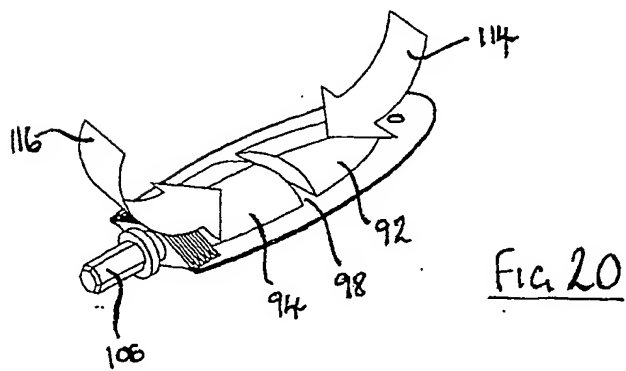
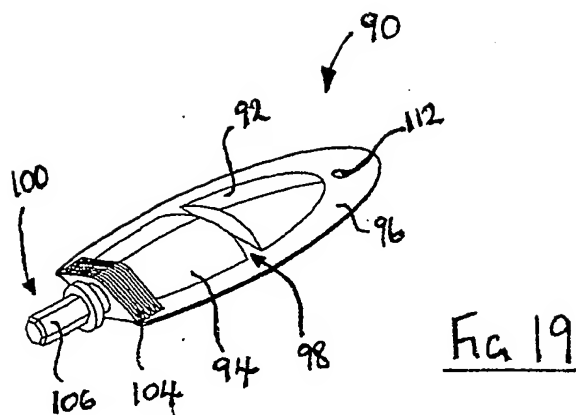


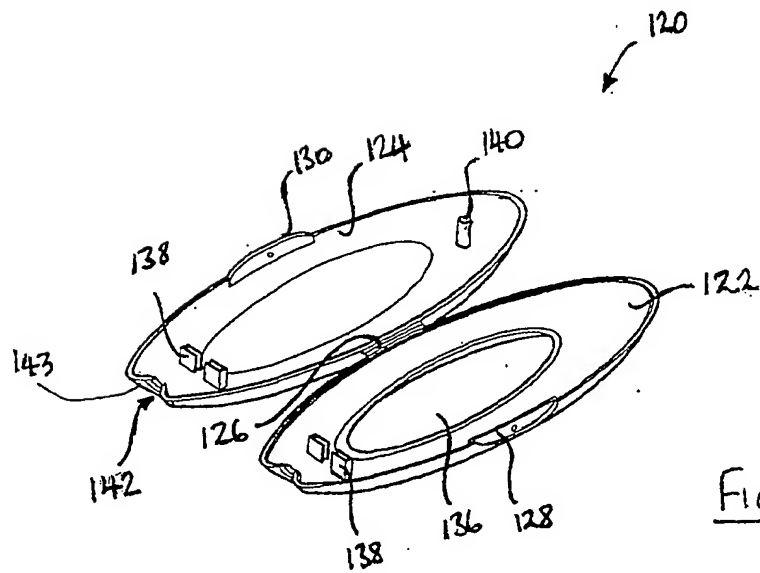
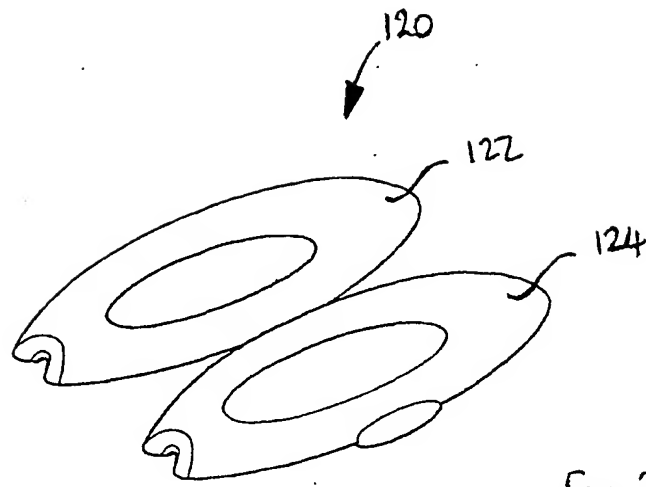












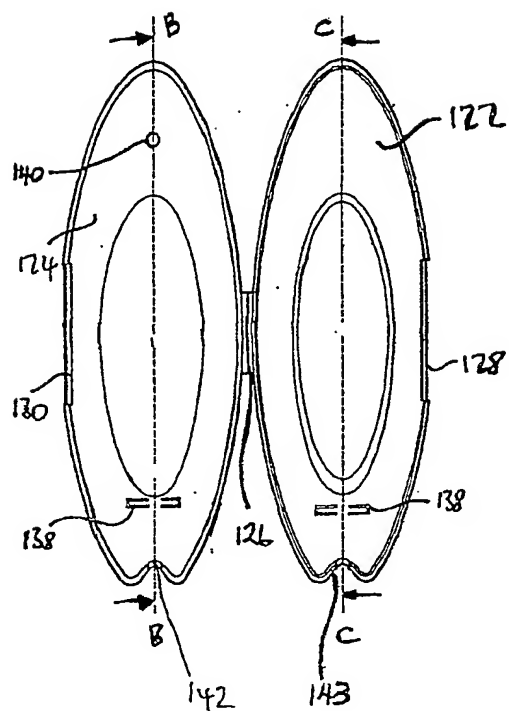


Fig 24



Fig 25

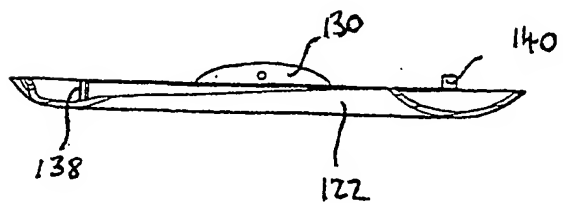
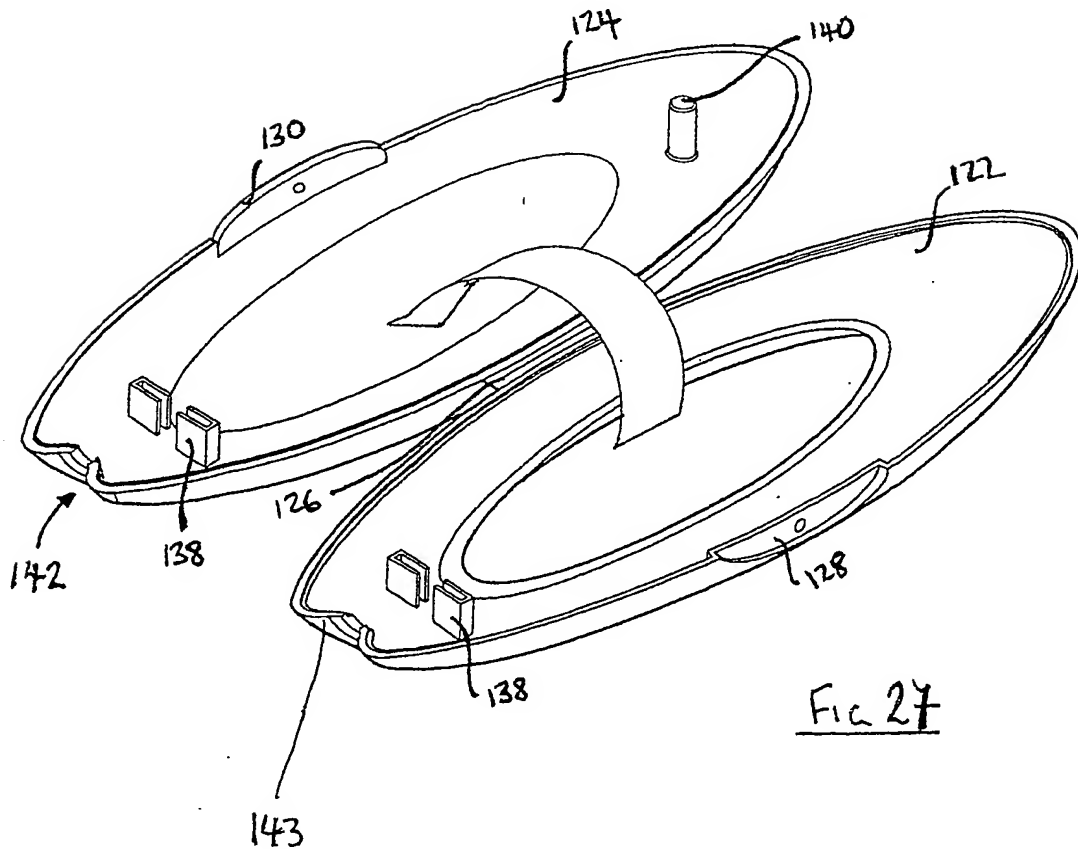
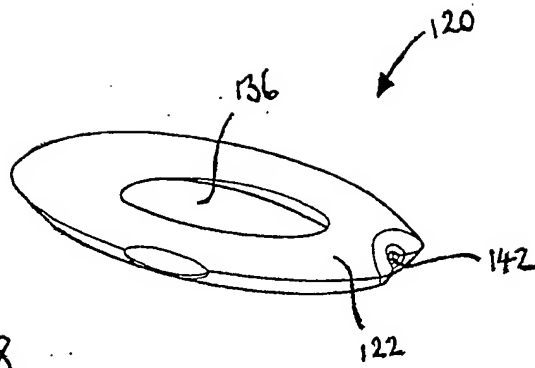
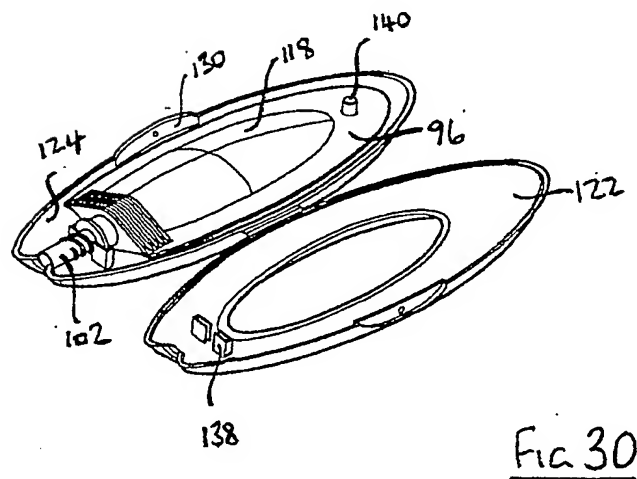
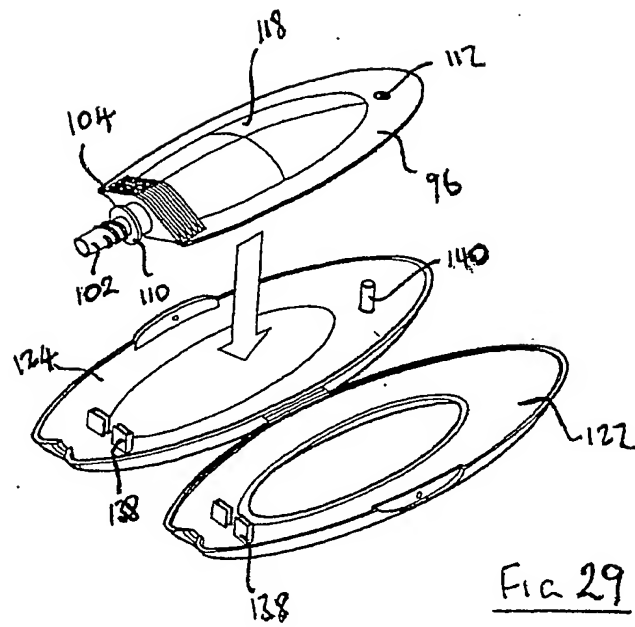
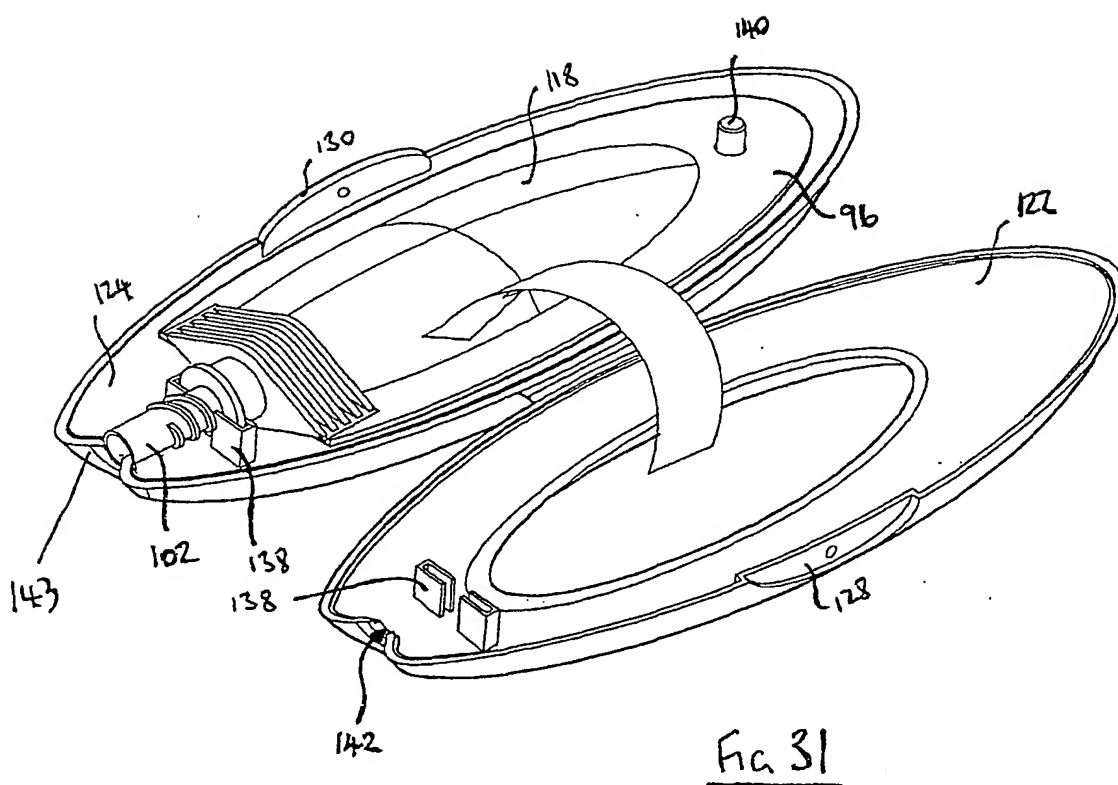


Fig 26







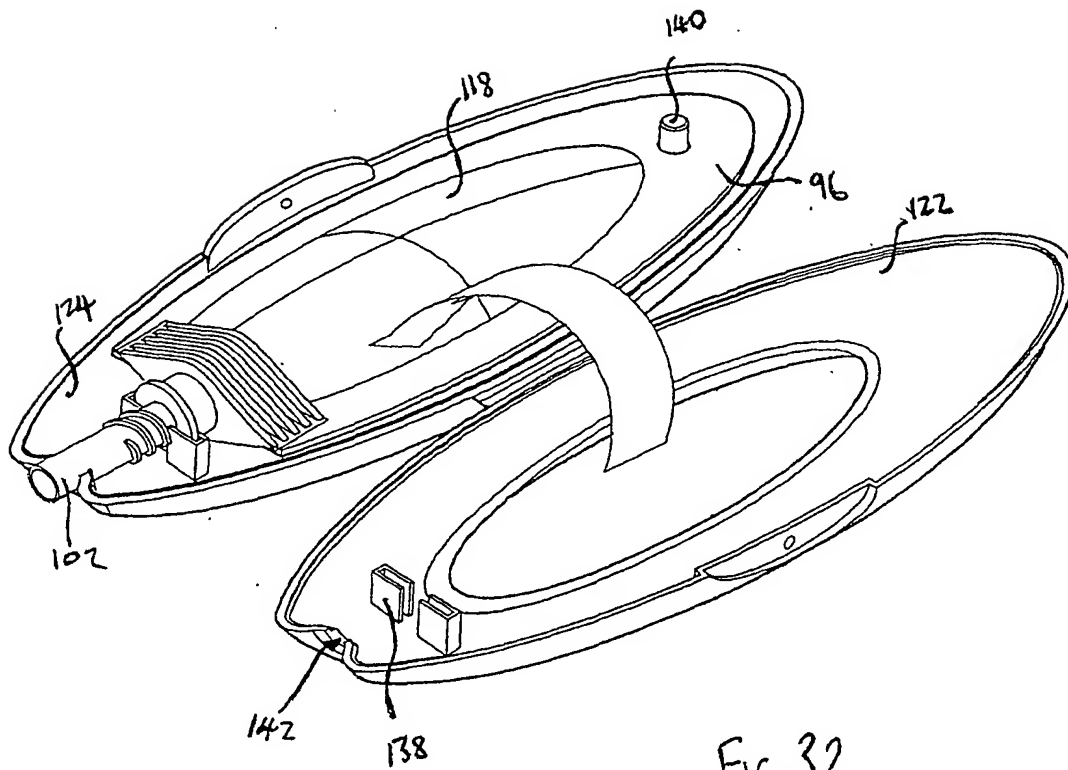
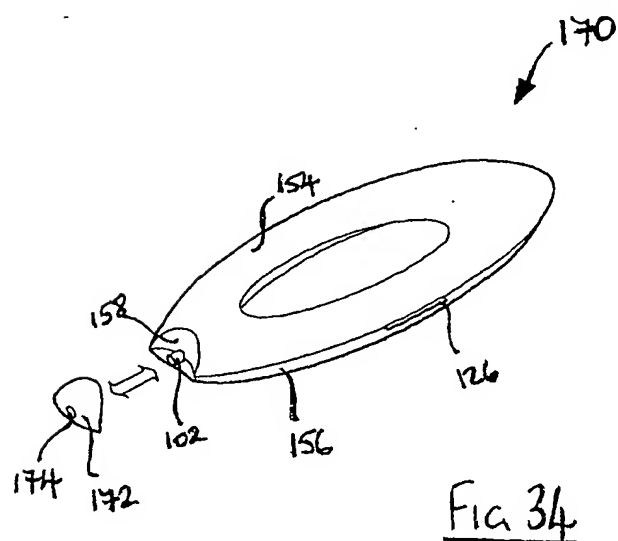
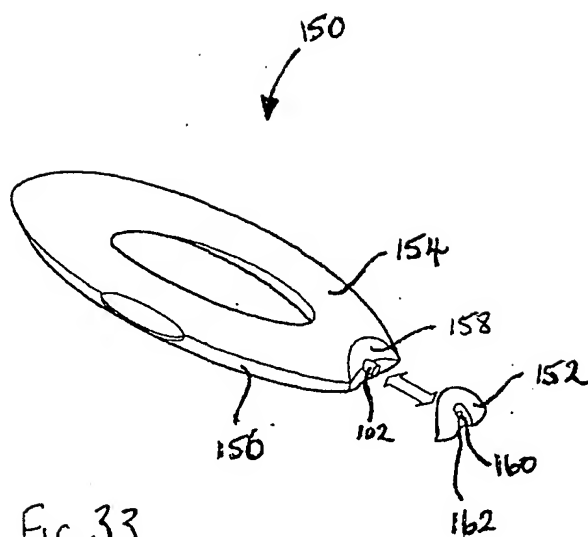
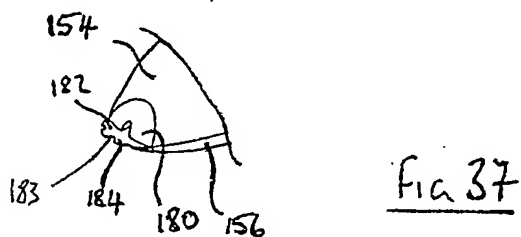
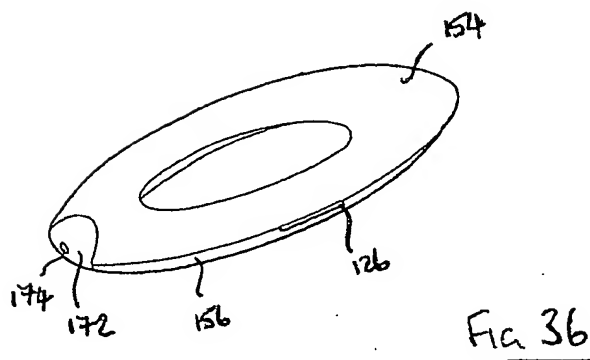
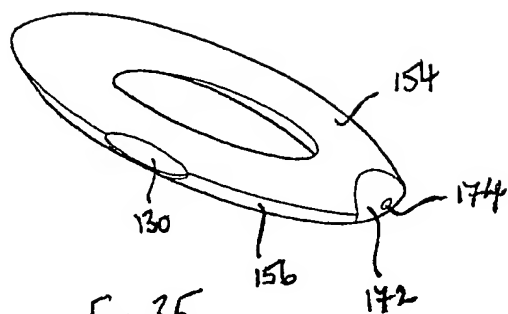
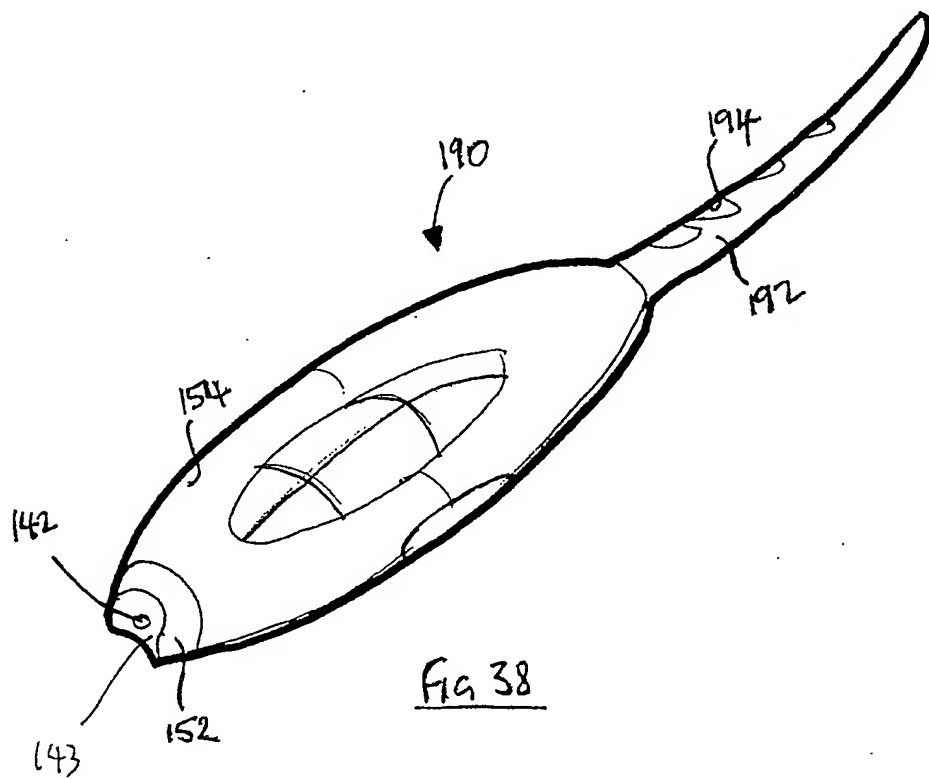
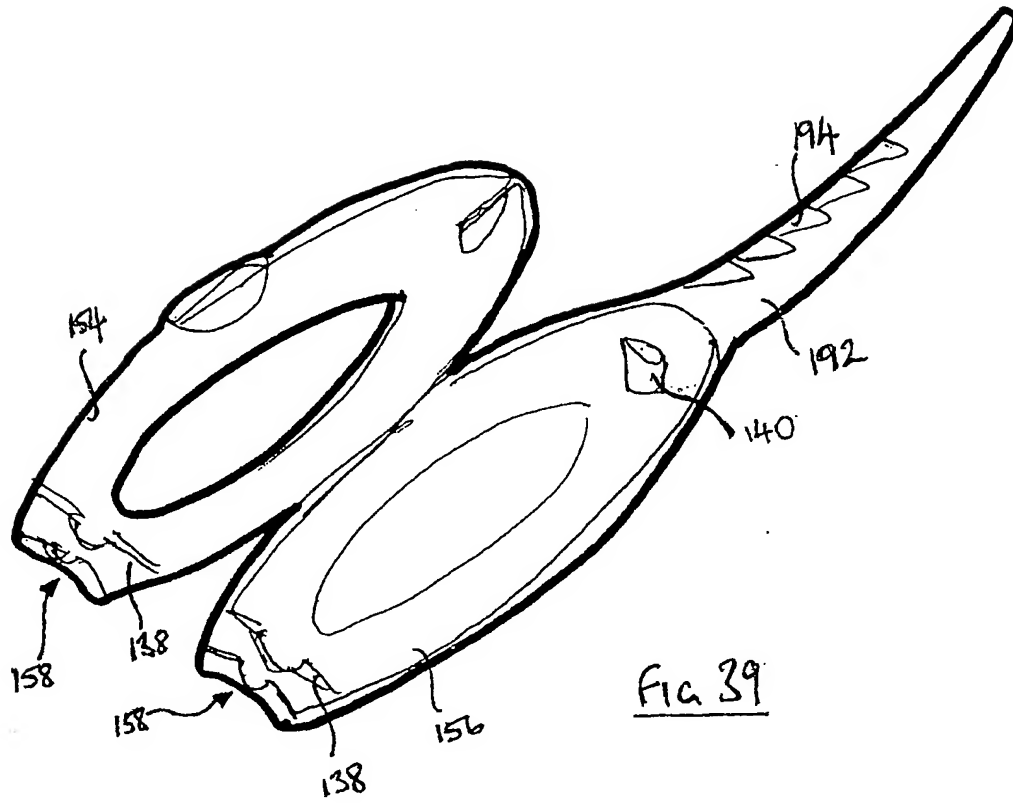
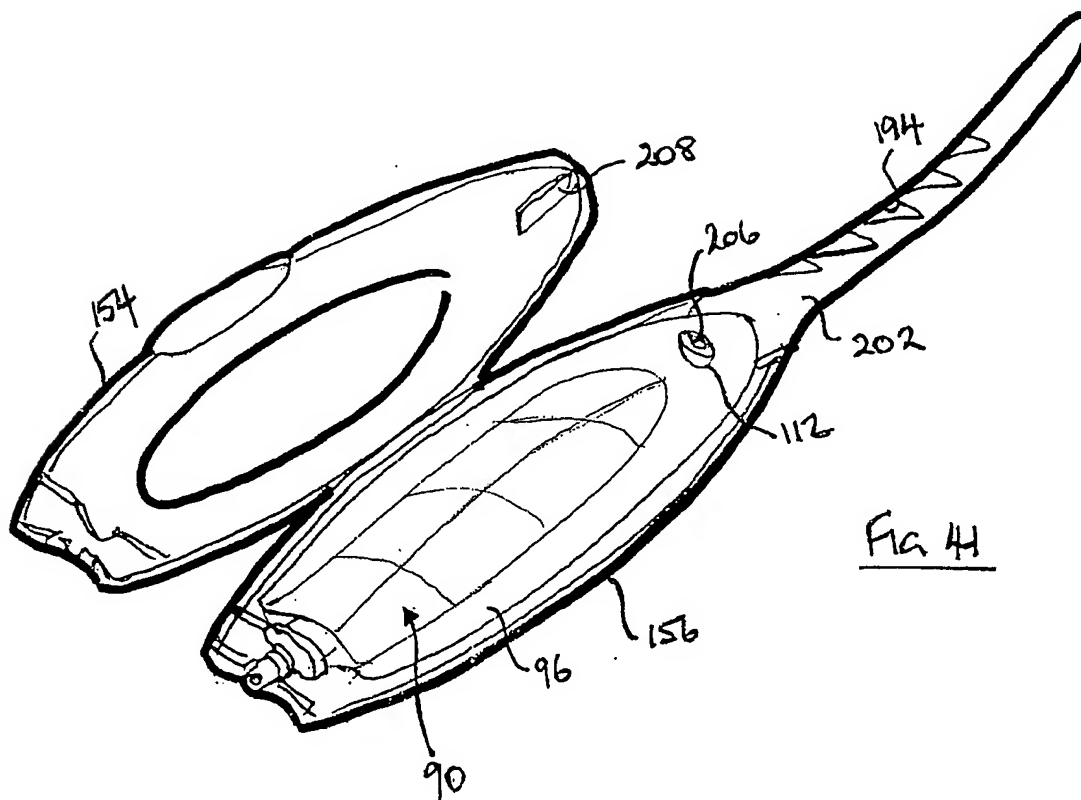
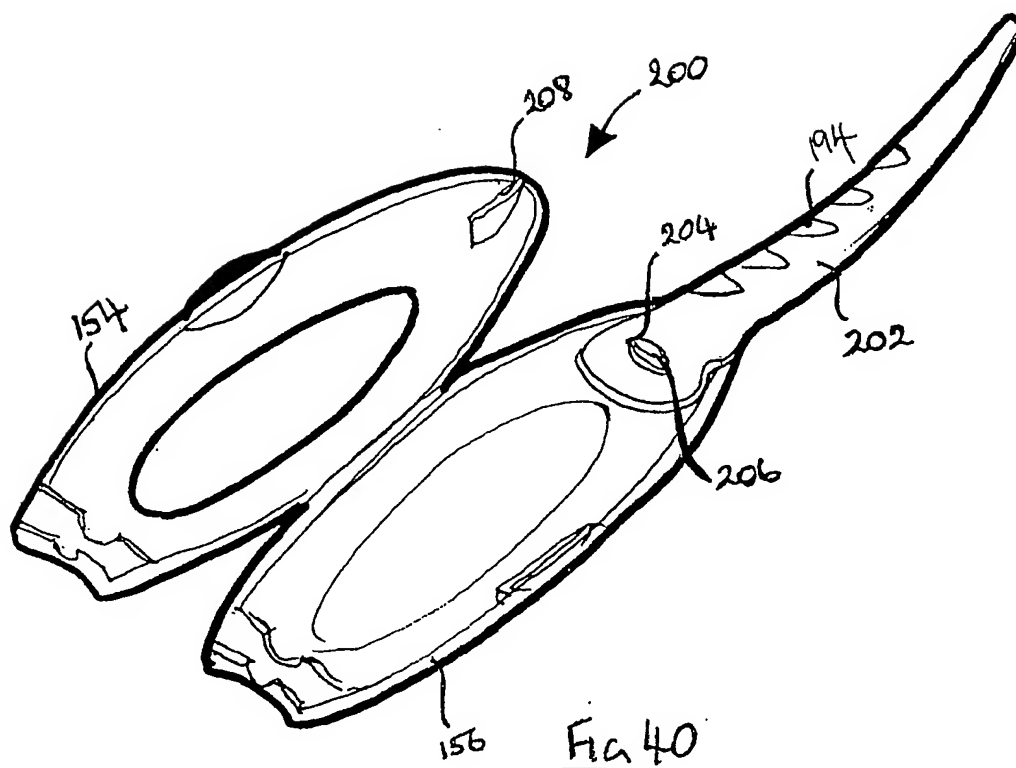


Fig 32









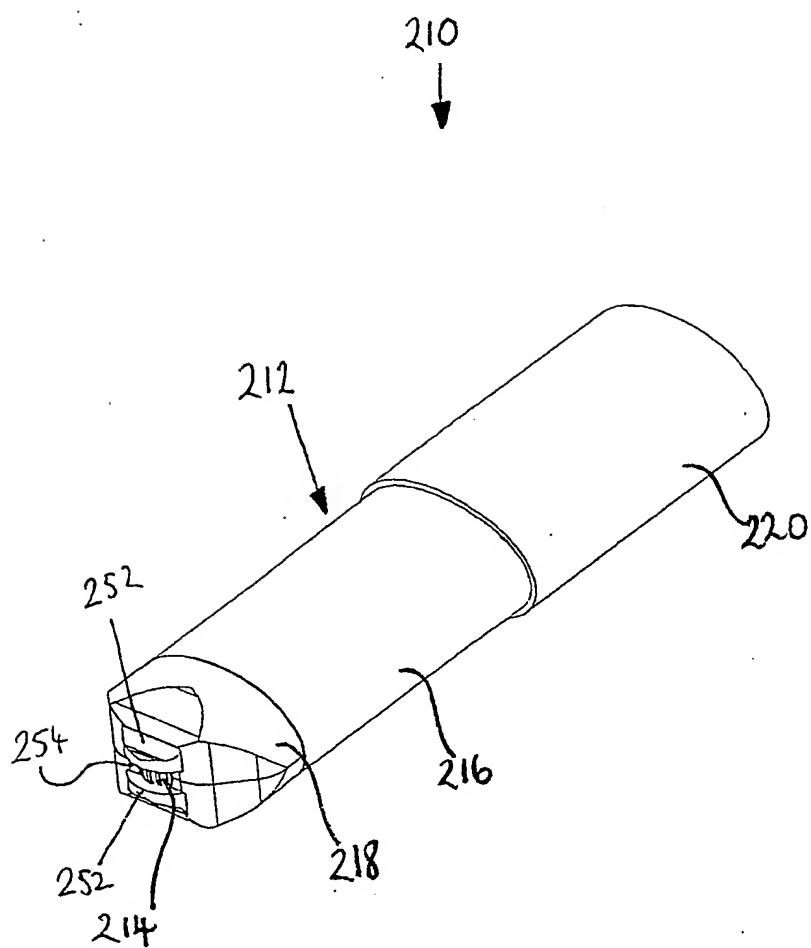
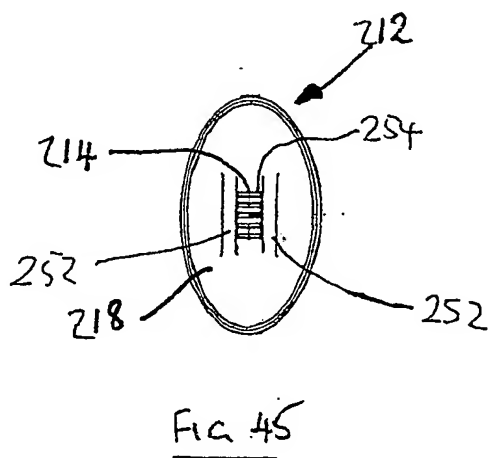
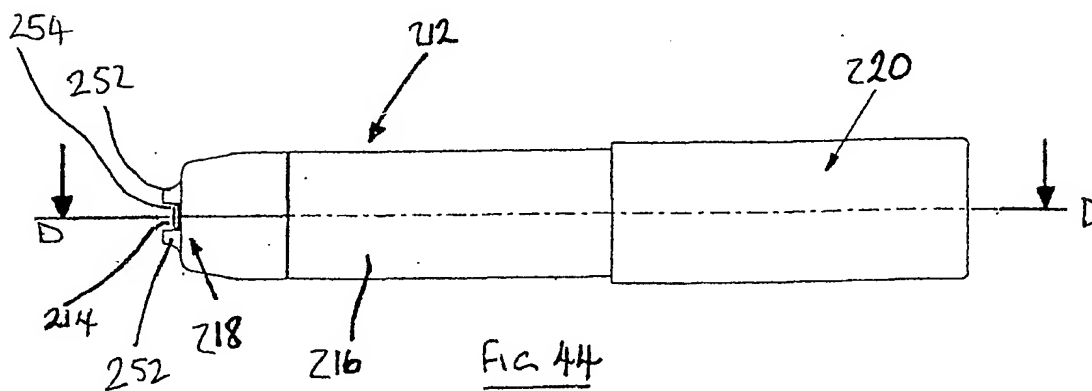
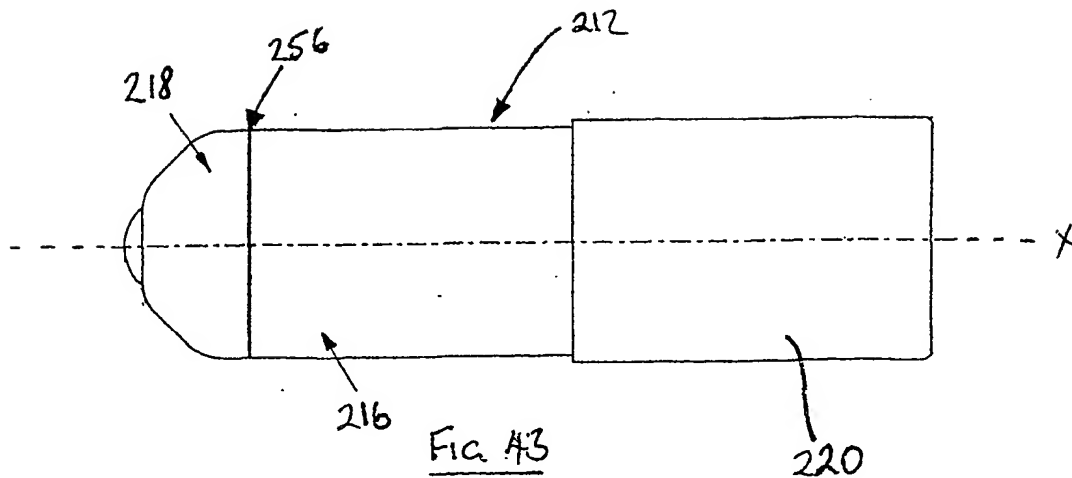


FIG 42



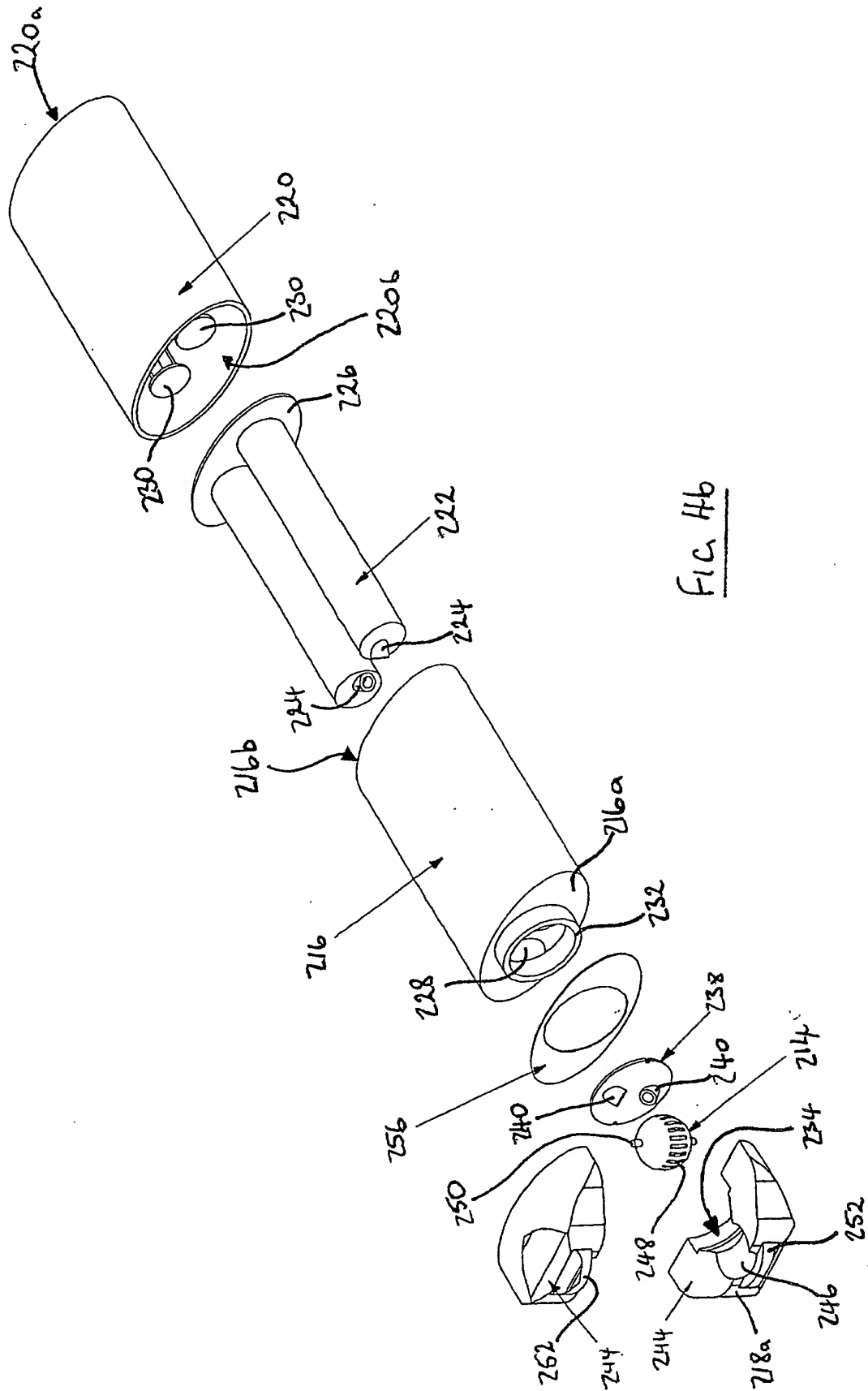
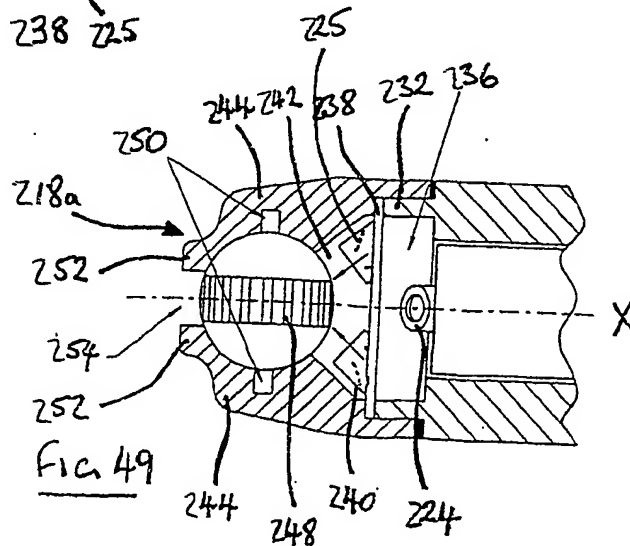
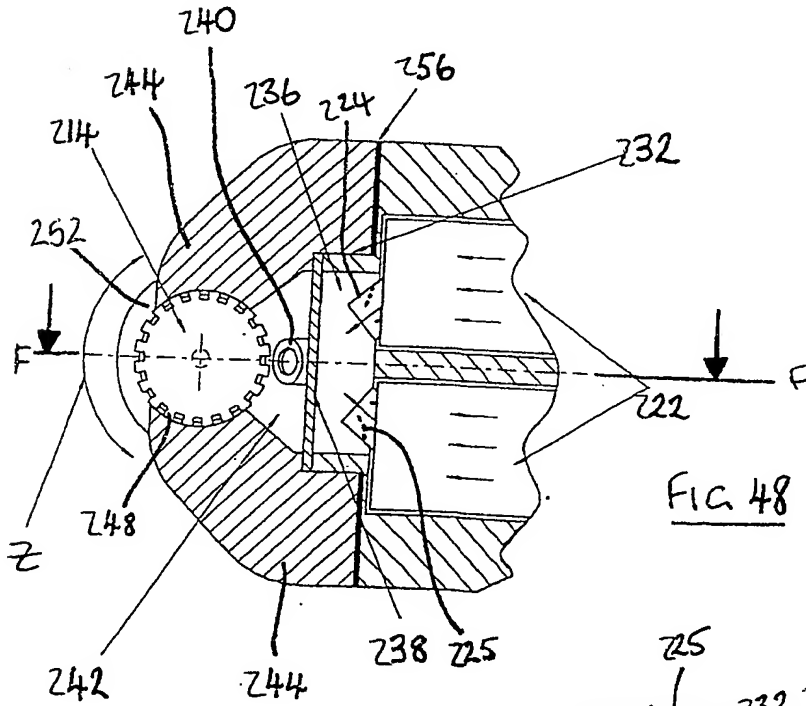
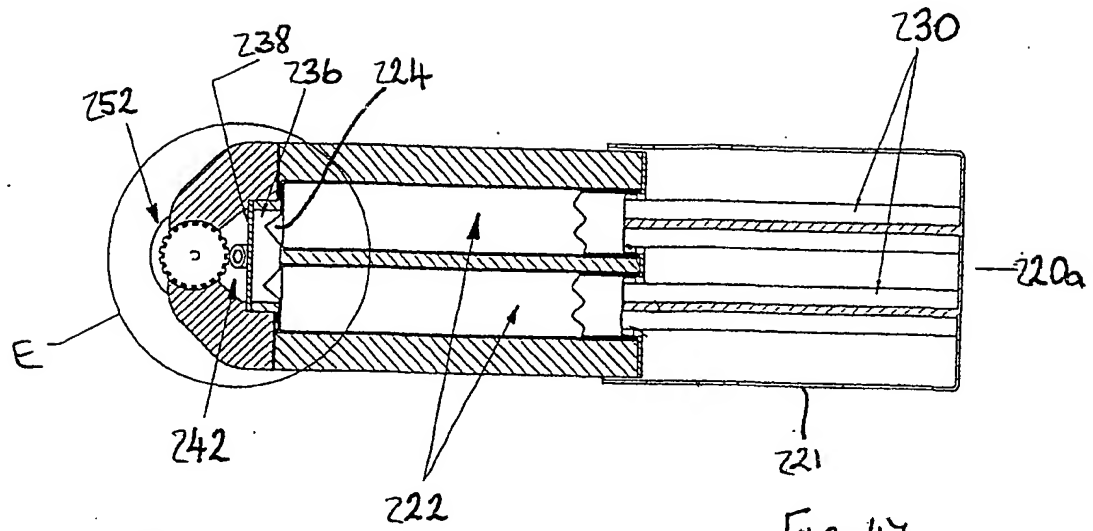


FIG. 11b



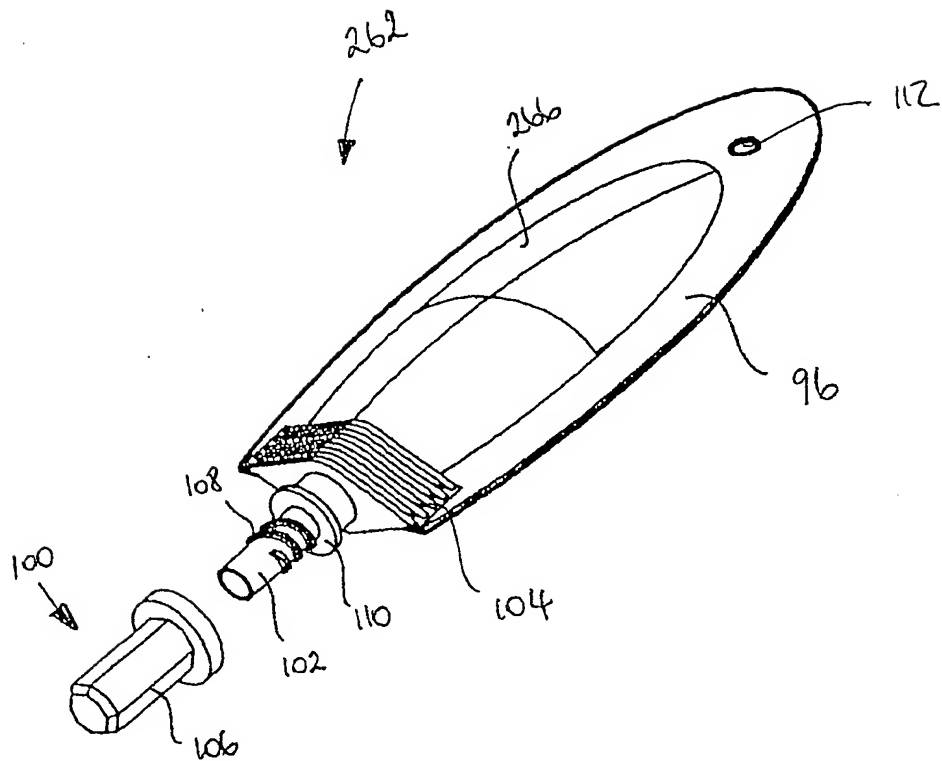


Fig 50

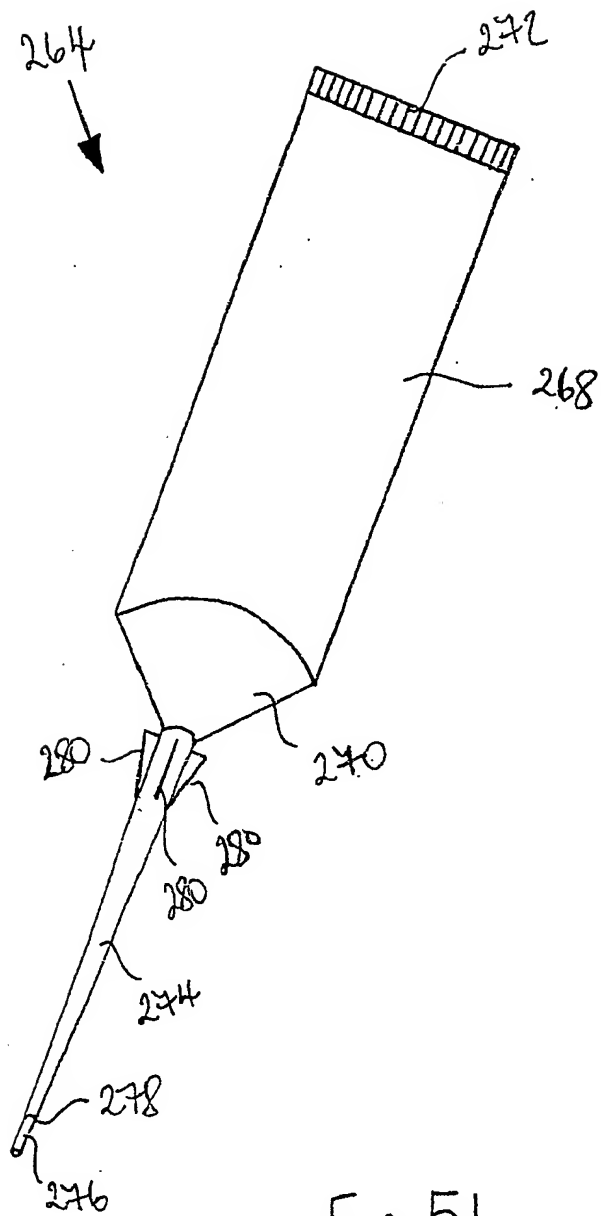


FIG 51

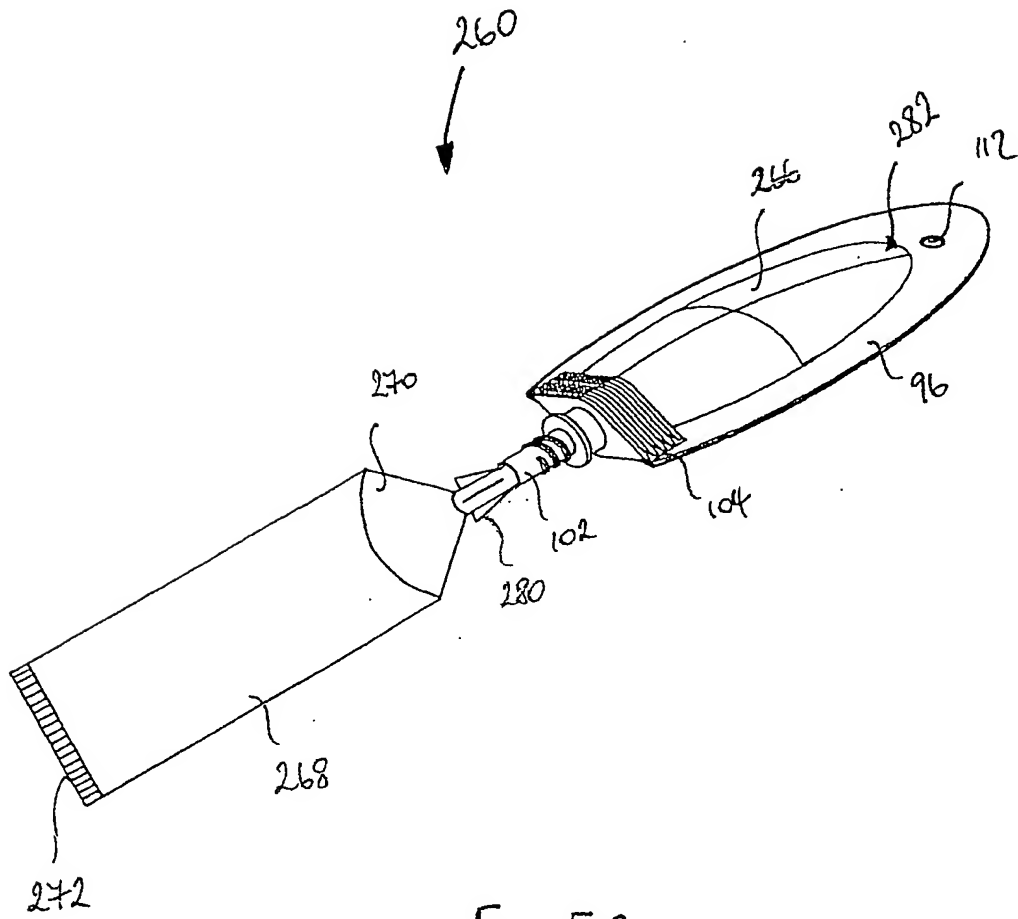


FIG 52

INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 01/04041

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 B65D81/32 B65D75/58 B65D77/06 B01F13/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B65D B01F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 00 09416 A (CIBA SC HOLDING AG ;TYLDESLEY FRANK (GB); BARNARDO CHRISTOPHER JOH) 24 February 2000 (2000-02-24) page 5, line 34 -page 7, line 19; figures ---	1,5-7, 15-17
X	US 4 871 091 A (PREZIOSI ROBERT) 3 October 1989 (1989-10-03) the whole document ---	1-5, 15-17
X	WO 00 09415 A (CIBA SC HOLDING AG ;TYLDESLEY FRANK (GB); BARNARDO CHRISTOPHER JOH) 24 February 2000 (2000-02-24) page 5, line 11 -page 6, line 9; figures ---	1,5-7, 15-17
A	---	8-11
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☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

18 December 2001

Date of mailing of the international search report

02/01/2002

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INTERNATIONAL SEARCH REPORT

International Application No
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>PATENT ABSTRACTS OF JAPAN vol. 2000, no. 07, 29 September 2000 (2000-09-29) & JP 2000 107255 A (SHOWA DENKO KK; SHOWA DENKO PLASTIC PRODUCTS KK), 18 April 2000 (2000-04-18) abstract; figure 3 -----</p>	1,15,18

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box I.2

Claims Nos.: 20-59

Multiple dependent claim 20 serves as basis for multiple dependent claims 21-59. The formulation of these claims results in such a large number of possible embodiments that the subject-matter for which protection is sought and the boundaries between the different inventions identified can not be defined (Rule 6.4 (a) PCT). A meaningful complete search is therefore impossible.

The applicant's attention is drawn to the fact that claims, or parts of claims, relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure.

INTERNATIONAL SEARCH REPORT

Information on patent family members

Inten Application No

PCT/JP 01/04041

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 0009416	A	24-02-2000	AU 5185899 A EP 1144269 A2 WO 0009416 A2	06-03-2000 17-10-2001 24-02-2000
US 4871091	A	03-10-1989	NONE	
WO 0009415	A	24-02-2000	AU 5185799 A EP 1105321 A1 WO 0009415 A2	06-03-2000 13-06-2001 24-02-2000
JP 2000107255	A	18-04-2000	NONE	

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